THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCIV. No. 2245.] LONDON, MAY 22, 1906. [58TH YEAR. PRICE 6d.

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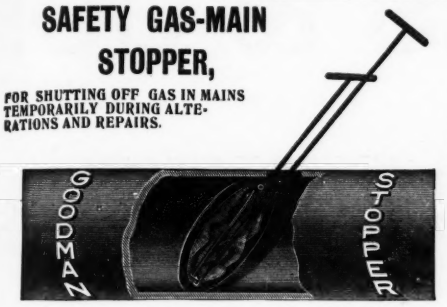

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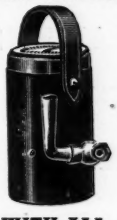

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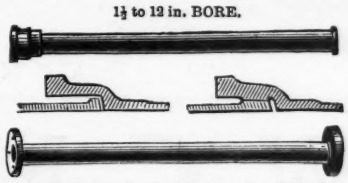

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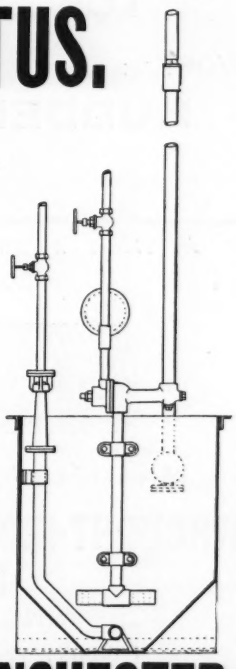

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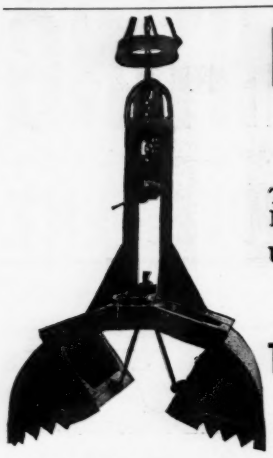

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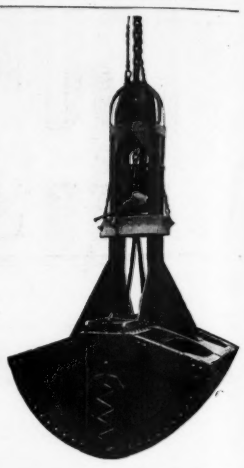

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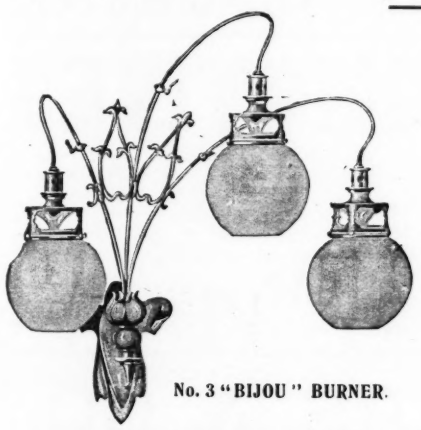

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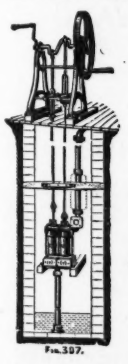

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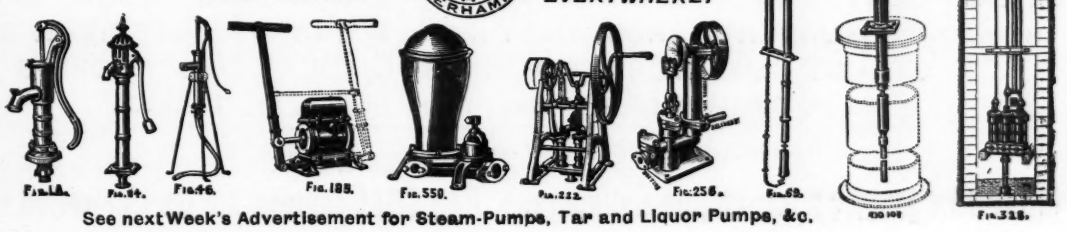

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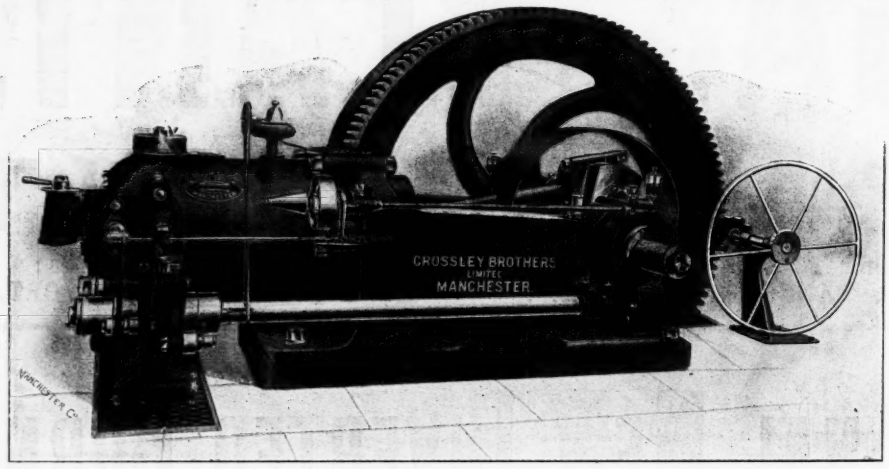

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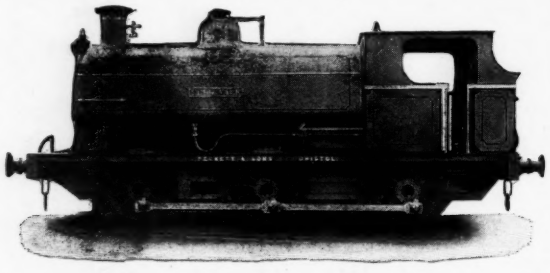

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Adequate but unvarying Pressure—

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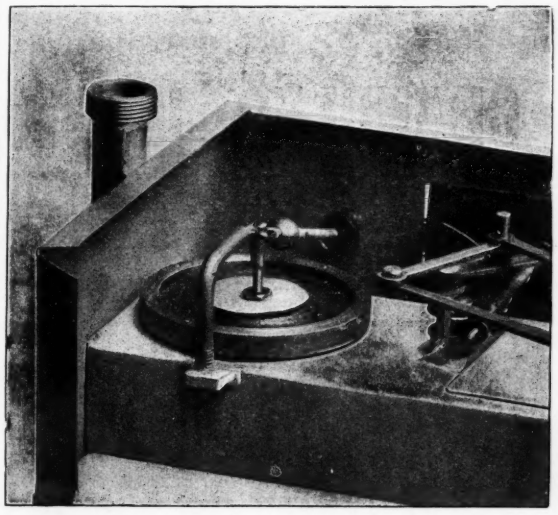

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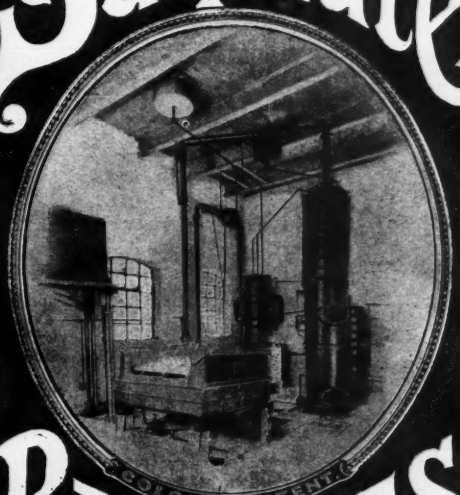

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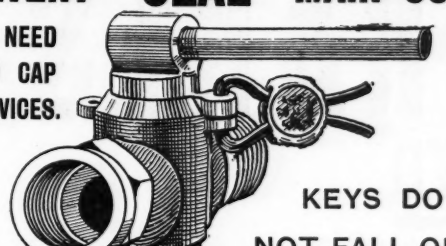

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As a Naphthalene Remover.

The Exhaust Steam heats up the Tar and the Gas, and enables it to remove the maximum amount of Naphthalene. By removing the Tar, no Naphthalene is carried forward to the Scrubbers, except in strong and thorough combination with an **EXCESS** of light hydrocarbons, so e[illegible] distribu[illegible] always sufficient in quantity to prevent [illegible] a on the phenols liberating the Naphth[illegible]

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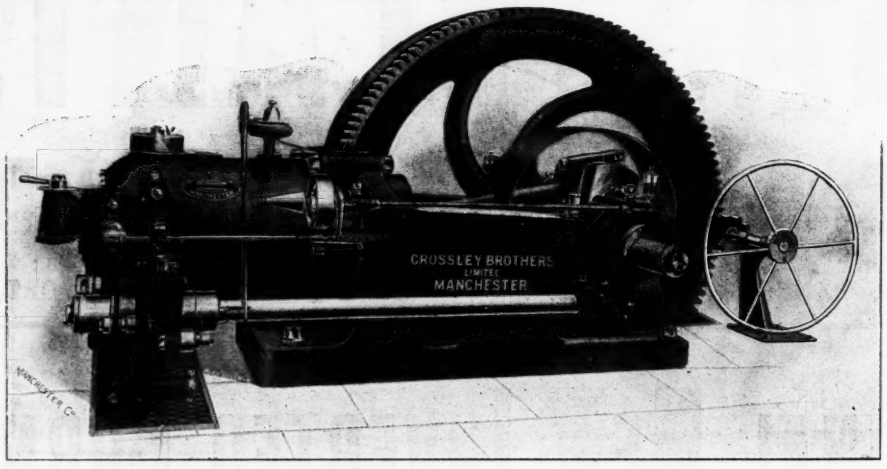

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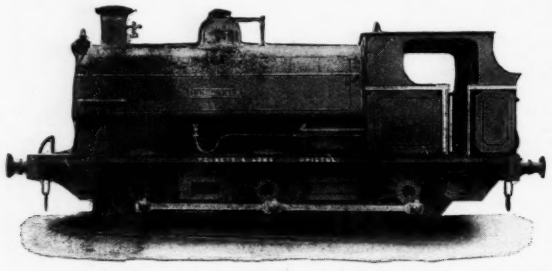

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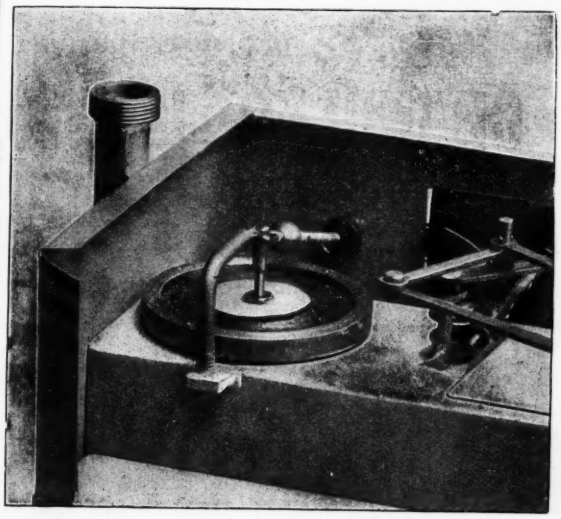

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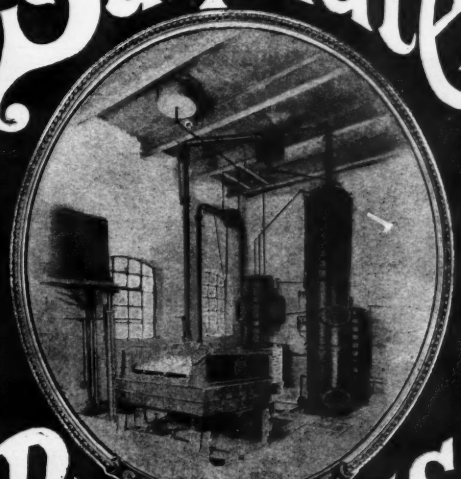

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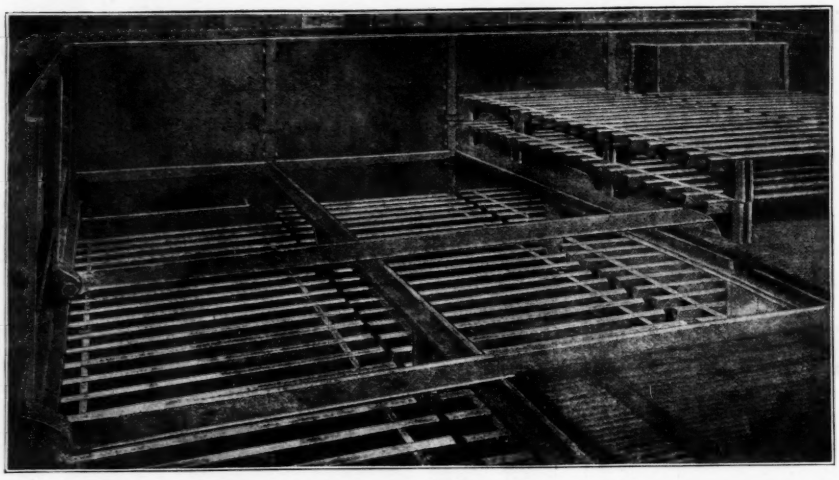

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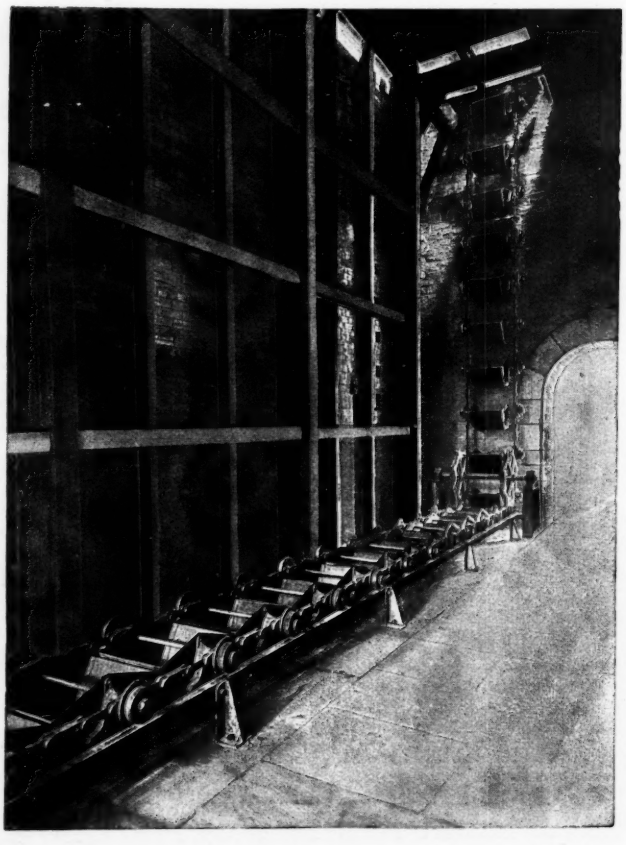

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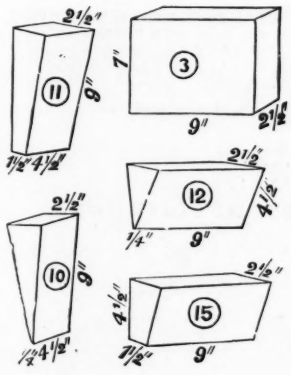

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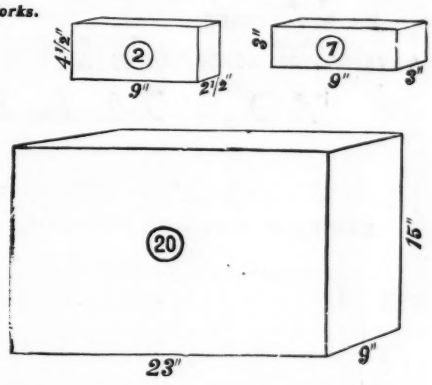

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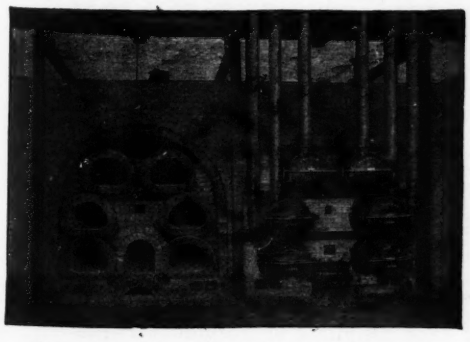

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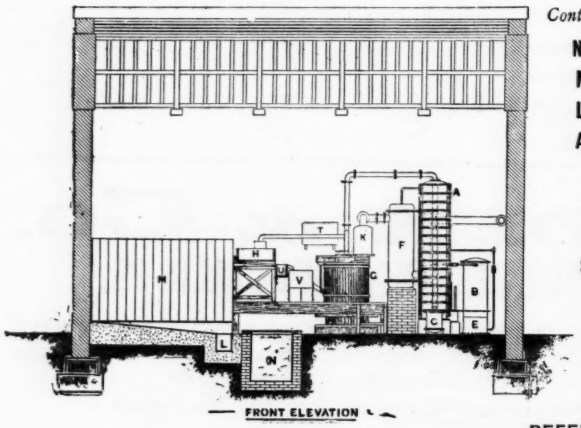

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MURIATE OF " "
LIQUID '880 " "
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TAR DISTILLATION PLANT AND SULPHURIC ACID PLANT.

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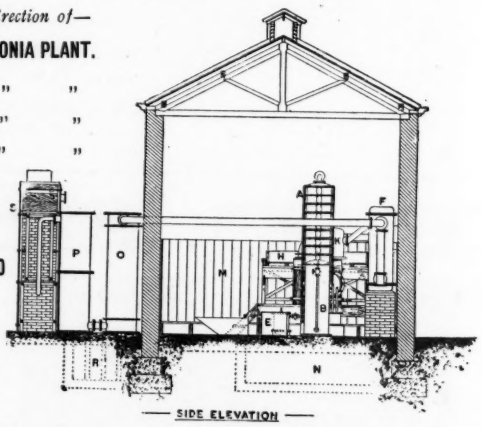
BLUES.



SIDE ELEVATION

REFERENCES.

A. Large Still (Ammonia).
B. Small Still (Lime).
C. Spent Liquor Valve.
E. Limeing Arrangement.
F. Heater.
G. Saturator.
H. Draining Table.
K. Lead Catch Box.
L. Mother Liquor Well.
M. Sulphate Store.
N. Acid Store Tank.
O. Condenser.
P. Scrubber.
R. Settling Tank.
S. Neutralization Plant.
T. Acid Supply Tank.
U. Mother Liquor Trough.
V. Mother Liquor Receiver.

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VOL. XCIV., No. 2245.—TUESDAY, MAY 22, 1906.

EDITORIAL NOTES—GAS, &c.

The New Testing Clauses and Illuminating Power.

IT is understood that the new testing clauses have advanced a stage since our Editorial Note on the subject of April 24; and that, though the exact terms have not yet been finally settled, the prescription of the bar photometer may be regarded as practically certain. This is very satisfactory; and if there should be any lingering doubt in the minds of the authorities as to whether the word "open" should continue to be used in describing this form of photometer, it is to be hoped that it will be resolved once and for all by adhesion to the terms of the Gas-Works Clauses Act, 1871, which prescribes the use of either a Letheby open or an enclosed Evans photometer. The latter is distinctly barred by all modern experience on the subject; but inasmuch as a "bar" photometer may either be open or enclosed, it is very desirable that the form of the photometer should be so far defined as to make it perfectly clear that the open bar and no other is meant. Beyond this it may not be desirable to go; but it will still be necessary to supervise carefully the arrangement of the photometer to be employed. In times past, some photometers have been constructed without a proper understanding of the conditions necessary to secure correct results; and these have had to be altered or discarded by those who have discovered, and probably suffered from, their defects. It can be no satisfaction to the users of such photometers to find upon them the seal of the Standards Department of the Board of Trade, placed there in ignorance, doubtless, of the defect referred to; although this only amounts to a verification of the graduation and length of the bar. A bar photometer should be as open and have as few screens as possible; and the standard lamp and gas-burner should be placed at a sufficient height from the table to secure immunity from sharp or cutting draughts. Subject to these conditions being observed, and to the photometer being placed in a well-ventilated room free from draughts, we have in the new regulations, comprising the use of the Metropolitan No. 2 burner and the 10-candle pentane lamp, that which has been striven for so long—namely, a system of testing equally suitable for all kinds of common gas, and by which comparable results can be obtained. The gas industry is to be congratulated upon this outcome of proceedings which, but for the resistance offered to them by the London Gas Companies, must have had the very opposite effect.

With regard to illuminating power, it may be mentioned that the authorities of Parliament are credited with the intention of prescribing in these draft clauses a standard of 14 candles. If that is so, it may be regarded as almost a hopeless endeavour to obtain from Committees on Unopposed Bills sanction for any lower quality than 14 candles, which, for the time at any rate, may be regarded as the minimum illuminating power recognized by Parliament, just as for many years the 15 candles prescribed in the Model Bill was the recognized minimum. For any reduction of this minimum, a strong and practically unanswerable case will have to be made out, similar to that by which the South Metropolitan Company carried their proposal for reduction in 1900. There is a further innovation in contemplation, to which attention should be drawn. This is the provision that the Board of Trade may, upon the application either of the gas undertakers or any five consumers, approve the use of any other burner, photometer, or standard light. This introduction of "any five consumers" will in all probability remain a dead letter, in which case it cannot prove to be of the slightest service. On the other hand, if acted upon, what assurance is there that it may not operate to the disadvantage of the undertakers? The proposed change of apparatus must, it is true, appear to the Board to be more suitable for testing; but the question is, How is this likely to be construed? Is, for example, a burner giving less light than the Metropolitan No. 2 per cubic foot of gas consumed to be considered on that account more or less suitable than the latter for testing? It must be remembered that the testing clauses do not provide—as does the London Gas Act, 1905—that the testing burner shall be "the most suitable for obtaining" from the gas the greatest amount of light. They only provide that the burner (the Metropolitan No. 2) shall be so used as to obtain from the gas when burned at the rate of 5 cubic feet per hour the greatest amount of light. With regard to pressure, it is so obviously to the interest of the gas undertaker to maintain sufficient for all the purposes for which gas is required, that we question the utility, or even the expediency, of any provision with reference to it. We believe it to be a matter that can be safely left to be dealt with according to requirements; and certainly a minimum of even eight-tenths may be looked upon more as a show of legislation than as any real or necessary protection to the consumer.

Meretricious Prospectuses.

IT can only be a matter of the profoundest regret to all honestly concerned in the administration of the gas industry that some of the undertakings on its fringe should have become the base of certain financially highly suspicious promotions. It has been our duty, and it is a duty we shall not shirk, to endeavour to assist in purging the industry of all operations of the kind, where it is clear that, while the speculative promoters will be enriched, only mischief can ensue to those investors who may be deluded by specious prospectuses into sinking money in concerns that, to the expert, show on their face that prediction has no concrete foundation, and that the sole object of the promoters is the bagging of an enormous price by the sale to the public. How to protect those smaller shareholders in existing substantial concerns who do not see the technical papers is a difficult problem; but things have come to such a pass now that Chairmen of Gas Companies will not be exceeding their duty in warning, on opportune occasions, their shareholders against investing in newly promoted concerns without thoroughly inquiring into the genuineness of their advertised prospects. Only by common effort in this direction will the good name and the security of gas stocks and shares remain unsullied in the eyes of investors.

There is ground for complaint on our part against the promoters of a concern bearing the title of the Kent County Gaslight and Coke Company, Limited, in that they did not favour us with a copy of their prospectus, either for our advertising columns or for notice editorially (we should have been equally contented one way or the other), in time last week to caution readers against putting their money, on the strength of the information given in the document, into a concern whose prospects, we say with deliberation, are of a more than doubtful and shadowy character. The subscription list opened on Tuesday (the day of the publication of the "JOURNAL"), and it was to close yesterday (the day before the publication of the present issue). Between those dates the prospectus has been issued broadcast, as we have been made aware by the copies forwarded to us by recipients; and there has also been a lavish expenditure on advertising in the principal daily papers. The title of the Company is high-sounding, comprehensive, and terribly misleading. It has only one claim to suitability, which is that the characteristics mentioned harmonize admirably with those of the prospectus itself. In this connection comes to mind the West Suburban Gas Company, Limited, whose prospectus was criticized in the "JOURNAL" last August. There is a strong family likeness between the prospectus of the "Kent County" and West Suburban Companies; and these particular promoters may be counselled to exercise in future a little more care in the revision of new prospectuses before they are issued to the public and to critics. The West Suburban

Company proposed a capital of £30,000 for a weakling in the way of a gas undertaking, known as the Colnbrook Gas-Works. It is, to say the least, humorous to find that the "Memorandum of Association" appended to one of the earliest issued copies of the Kent County Company's prospectus states that one of the objects for which the Company is established is: "To adopt and carry into effect, either "with or without modification, an agreement . . . for "the acquisition of the Colnbrook Gas-Works." In subsequently received copies of the prospectus, this had been corrected to "Goudhurst." In the West Suburban prospectus as in this "Kent County" one, the same sop in the shape of the guarantee of a year's dividend was offered to investors. The one year's guaranteed dividend in the Goudhurst case is 6 per cent. on the preference shares, and 8 per cent. on the ordinary.

Apart from enriching the vendors of the Goudhurst Gas-Works, and the promoters of the Company, who are one and the same firm of F. C. Lawson and Co., the proposal is to acquire the Goudhurst Gas-Works, and to develop them by the erection of additional retorts, retort-houses (mark the use of the plural), purifiers, &c., to develop the business, and to carry gas-mains to some twenty places that have hardly reached the dignity of villages, and some of which are between 2 and 3 miles from the Goudhurst works. The public are assured that in the gas supply to these pastoral districts there is a veritable gold mine; and therefore with towering audacity, the promoters offer at once to the public "the "whole capital" of £50,000. The prospectus says nothing as to the business done at Goudhurst; but the promoters know there is excellent reason from their point of view for evasion. The latest returns show that the sale of gas in this the kernel of the Kent County undertaking was, dating from a few months since, only 3 to 3½ million cubic feet per annum; and the total number of consumers was but a few over 100. The public have no ready means of investigating these matters for themselves; and it is a monstrous condition of affairs that permits promoters to float such undertakings without divulging precisely the essential particulars as to existing business. The only light that the prospectus throws on the present trading is that "one cus- "tomer alone" runs up an account to upwards of £100 per annum. A bright prospect truly for those unwary investors who have entrusted their money to the promoters of the concern! Those who have only sent in their application money will have to decide for themselves whether they have not already parted with enough; and whether the balance of £4 10s. per share had not much better remain snug and safe with their own bankers.

While the prospectus does not refer to what the Goudhurst undertaking has done, it does state what has been accomplished in London in letting out cooking-stoves and in the development of business through prepayment meters. London and Goudhurst! The boldness of these promoters is both ineffable and laughable. Goudhurst is the backbone of the undertaking; and yet recent returns only exhibit a connection of between 60 and 70 cooking-stoves and about 50 prepayment meters! If this is the best that has been done up to the present about the hub of the Company's operations, what can be expected in the future with gas at the same price as now—for all the vague computations are based on spectral business above the 3½ millions now done at the current charge of 5s. per 1000 cubic feet. The prepayment consumers are charged 2½d. more. Vagueness and omissions are, in such cases as these, close confederates of deception. It is asserted that requisitions agreeing to use gas as soon as the mains are laid have been signed by "a very large number" of inhabitants of the district. Why is the number not mentioned, if it is really "very large"? It is also calculated on "a "modest" computation (it would have been rather more correct to have used the qualifying term "immodest") that, in the good times to come, there will be in the district a sale of more than 50 million cubic feet per annum. Those times will not be during the lives of the present or the next generation. The Goudhurst Gas-Works, it is stated, has a "good connection, well established." The person or persons who drafted this prospectus must have an elastic imagination and conscience. The "good connection" is represented by the before-mentioned 3½ million cubic feet per annum! From 3½ millions or so to 50 millions is a long stretch for a rural district, with country lanes connecting up diminutive clusters of farmhouses and cottages. We have tried in vain to find the ground for the "modest" calculation of a possible consumption of 50 millions. The person who puts forward this ludicrous estimate is a Mr. G. T. Harrap, whose name is not familiar as a gas expert. Constructed upon his report is an estimate by a Mr. H. W. Parker, a Chartered Accountant, who, on the basis of the mysteriously assumed prospective consumption of 50 million cubic feet, at 5s. per 1000 feet, has no difficulty in showing a dividend of 6 per cent. on the preference shares and 14 per cent. on the ordinary shares, with a surplus of £2253 6s. 8d. On ruling conditions, if the capital of £50,000 be subscribed, it is impossible to see how there can be a penny piece for the shareholders; for the vendors are to receive the monstrous sum of £21,800 for this undertaking, by the payment of 20 per cent. in cash, and the balance in cash or the allotment of fully-paid preference or ordinary shares of the Company, out of which £21,800 they are to pay the promotion expenses. These very works were offered for sale, as our "Correspondence" columns show, not long since for £3000; and it is believed they were eventually sold for £2300. The impudence of the promoters is crowned by a liberal use of the names of highly prosperous Gas Companies in Kent and elsewhere, to show the profitable nature of gas investments; but these are not concerns doing a miniature gas business on a capital many times too great. The promotion is an outrage on the fair name of the gas industry; and we hope that those responsible have met with the failure their ignominious venture deserves.

Another prospectus before us this week refers to the Laindon and District Gaslight, Coke, and Water Company, Limited. It is a promotion of the Water-Works, Lighting, and Power Investment Corporation, Limited, of 99, Cannon Street, E.C., which address has on previous occasions come to our notice in connection with "enterprise" in gas and water promotions. This Laindon scheme is another visionary project, with an extremely weak case, upon which it is hoped to place a capital of £12,000. All who read the prospectus with care will resolve to keep their money in their own pockets, and leave the "Corporation" with the long name and big ideas to get all the benefit they can out of their petty water plant and the gas-works that are yet unbuilt, and which the vendors have undertaken to construct if the public supplies the capital. It is extremely considerate of the vendors, whose reputation as gas-works constructors has not reached our ears, to undertake this work; but as they appear to be hoping to get £9500 out of the capital of £12,000, we should like to know something as to the capability of the water plant, as to the proposed capacity of the projected gas-works, and what promises of actual gas business have been secured. It would also appear that out of the difference between £9500 and £12,000 the Laindon Company are to pay the promotion expenses, which are estimated not to exceed £1600. Therefore, of the £12,000 (if obtained) there will be little left for carrying on the undertaking. We have not the space to spare to point out where some of the comments on the Kent County prospectus would fitly apply to this one; but it may be of interest to the promoters of the Laindon concern to know that a Parliamentary Committee last week, in connection with an Electric Power Bill, were very particular in obtaining an assurance that the Company's Act would not be treated as a marketable commodity.

Finance.

At this season of the year, the long-suffering ratepayer learns what is to be his fate for the ensuing year; for local budgets are, like the national one, made up to the 31st of March. Special interest attaches this year to the budget statement of the London County Council, having regard to the large schemes which the Council have in hand, or are promoting. On the whole, Lord Welby was able to make a statement which was reassuring, in so far as it revealed a surplus of income over expenditure of £40,182. This surplus, it was explained, would have been larger but for the heavy loss of £51,205 on the steamboats. This is the amount which the ratepayers have had to lose in order to maintain a service which nobody wants—at any rate during the winter months; nor is it satisfactory to know that in the estimates for the current year a further deficit of £51,955 has had to be provided for. An increase of 1d. on the rates for education purposes is all that is asked for this year; but, in the opinion of Lord Welby, it is evident that further increases in the education rate must be expected. In view of this, his suggestion that expensive sites and decorated

buildings were items in which expenditure might be retrenched in the interest of the ratepayers is one deserving of the most serious consideration. We read with amazement of the extravagance imputed to the Poplar Guardians in this connection. The general fittings of a school erected by them are described as going a long way ahead of any public school, such as Eton or Harrow. This gives startling emphasis to Lord Welby's warning; and the perpetrators of such extravagance will only have themselves to blame if, with the equalization of rates for which they are agitating, they find their powers of expenditure greatly curtailed.

The Finance Committee of the London County Council have had under consideration important proposals with regard to the equalization of rates, and have reported to the Council thereon. In their opinion, "the practical difficulty "of any complete scheme of equalization of rates lies in the "question of the control of local expenditure. If the power "of incurring expenditure is in large measure divorced from "the rating liability, local extravagance will be the inevitable "result. The real question for consideration is the amount of "margin of local liability which must be allowed to remain "as a check on the exercise of the spending power of the "local bodies. In our opinion, the amount of this margin "must vary in proportion to the amount of central control— "that is to say, the greater the amount of effective central "control, the greater is the amount of expenditure which can "be safely made the subject of an equal rate. The weaken-"ing of local responsibility, which must be the result of any "considerable scheme of equalized rating in London, must "be compensated for by giving larger powers of control to the "central authority." If anything were needed to justify this conclusion—which must commend itself to every thinking person—the example of Poplar might be cited. The case of this Union was recently brought by Lord Balfour before the House of Lords, and the information was elicited that the Local Government Board had instructed their Chief General Inspector to inquire and report as regards the general industrial and financial conditions of the Union, its pauperism, and the administration of the Guardians and also their officers. This is preliminary to a decision as to whether a public inquiry is desirable. Clearly a *primâ facie* case has been made out for such action on the part of the Local Government Board when it is stated that in Poplar one in every sixteen of the population is in receipt of poor relief in some form or other, and that since 1901 the cost of the indoor paupers has risen by 2s. per head per week. It is further stated that the rates of this Union are 12s. in the pound, and the actual cost of outdoor paupers has risen from £16,000 in 1901 to £35,000 in 1905. There are but 3000 paupers out of a population of 539,000 in adjoining Unions, whereas in Poplar, with a population of 169,000, there are nearly 7000 paupers. In the latter Union there has been an increase since 1901 from 3481 to 7384 paupers in 1905, whereas in the adjoining Unions referred to above there had been an increase of only 500 during the same period.

These remarkable figures were attributed by Lord Balfour partly to what he described as the vicious system of compounding. It seems that, of the total rateable value of Poplar—amounting to £830,000—£370,000 consists of public property in respect of which no one is qualified to vote; and of the remaining £460,000, only £170,000 represented rateable subjects above £20 in value. So that £290,000 is the subject of compounding; and those who pay rates in this way have no first-hand knowledge of what they pay for local administration. Attention was called to this subject a few days later in the House of Lords by the Earl of Denbigh, who pointed out that, under the present system of local taxation, not only does the greater part of the accumulated wealth of the country contribute comparatively little to local charges, but also that by the system of compounding a large number of those who elect the local authority are insufficiently informed as to their share in the growing burdens imposed upon the ratepayers. This system, although it saves some expense of collection, is extravagant in proportion to the composition allowed to the landlord. The remedy suggested is to lower the compounding limit, and introduce uniformity of system. Attention was also called to the anomaly existing at the present time in the extent to which limited companies are rated without having any voice in the administration of the money they pay. To take a single instance, the Railway Companies pay in rates and taxes about £273 per mile per annum, in the expenditure of which they have no voice. It is satisfactory to know that the Government admit the desirability of dealing with the whole subject of local taxation, though when they will be able to find time for it is another question.

To return, however, to Lord Welby's statement, it appears that the total actual and estimated expenditure on authorized tramways is £10,918,034, about £6,000,000 of which is required to complete the work of electrification. This is at the rate of about £90,000 per mile, which seems a very excessive expenditure, even for London. It is, however, satisfactory to know that the Council are alive to the necessity of setting aside substantial sums for renewals. Hitherto it has not been possible to do so much in this direction as is admittedly desirable; but the Council propose to raise the fund, as soon as possible, to the standard figure of 1d. per car mile run. Whether or not this is sufficient will be further considered when this standard has been reached. It will be seen from this that the prospect of reduced fares is a remote one; but the public will be disposed to forgive much, if the service be good and thoroughly reliable.

Oil; and the Standard Oil Company.

Owing to various causes, the oil market has of late been a good deal perturbed. There was an interruption of the supply of Russian oil in consequence of the serious disturbances last year in the neighbourhood of Baku; while more recently there have been disquieting rumours as to quality. Both are factors of very serious import to all who have been led from various causes to rely—perhaps more and more—upon carburetted water gas during recent years; and they cannot be ignored by any who may have the question of the adoption of this gas under consideration. There is no denying the advantages possessed by carburetted water gas in the great facility with which the plant for its production can be brought into operation; although it is not a little remarkable that conspicuous instances have occurred of partial failure to meet exceptional demand, brought on by foggy weather, by users of this gas. Such as it is, however, this advantage may be bought too dearly; and should this alleged reduction in quality prove to be permanent, the props on which so many have been led to rely may prove to be unstable.

In this view, the course taken by Mr. William Newbigging in his recent report to the Gas Committee of the Macclesfield Corporation may be commended. He had to consider the best means of meeting a daily output of gas which now considerably exceeds his storage capacity; and he decided to recommend an increase of storage capacity rather than the installation of carburetted water gas. A summary of this report was published in the "Journal" for Feb. 20 (p. 515). He bases his rejection of carburetted water gas upon the fact that circumstances have changed since 1900 (when his predecessor recommended this plant), inasmuch as the great and increasing demand for petrol for motor cars has resulted in the extraction of the lighter distillates from the oil—leaving behind an oil which does not yield the results obtained in 1900. The difference in cost of producing water gas and coal gas has always been slight; but this "sweating" of the oil is increasing the cost of water-gas manufacture, and the probability is that the cost will be permanently maintained. This is not good news for the carburetted water-gas maker; though the gas consumer may hail with some satisfaction the prospect of a smaller admixture of gas of comparatively low calorific value.

Nor, according to the latest accounts from America, has the water-gas manufacturer the satisfaction of dealing for his oil with people who are without reproach. The more than princely fortunes accumulated by the owners of the Standard Oil Company have been the wonder of all, and probably the envy of many; but very few have had any idea of the way in which these gigantic fortunes have been built up. To a great extent, however, the secret has now been revealed. President Roosevelt—to whom the commercial world in America is indebted, according to some people, for his efforts to secure purity of commercial dealing—has had his attention directed to the Standard Oil Company, and has ordered an inquiry to be instituted into its methods. The report which resulted has been sent by him to Congress, with a Message pointing out that it is of capital importance in view of the efforts being made to secure such enlargement of powers as will enable the Inter-State Commerce Commission to adequately meet the needs of the situation.

Briefly stated, the Standard Oil Company are accused of

having benefited enormously, up to almost the present moment, by secret rates, many of which are unlawful. This benefit amounts to at least £150,000 a year, and represents profit obtained at the expense of the railways, but with the ultimate result of obtaining a much larger profit at the expense of the public. In addition, the Company profit immensely by open rates so arranged as to give it an overwhelming advantage over independent competitors. It appears from the report that the Standard Oil Trust controls 23 million out of the total 26 million barrels of oil produced annually in the United States, and that the price of illuminating oil is 2 c. to 5 c. per gallon higher in non-competitive than in competitive fields. It finds that discrimination in the transport of oil embraces the following forms: (1) Secret and semi-secret rates; (2) discrimination in open arrangement rates; (3) discriminations in classification and rules of shipment; (4) discriminations in the treatment of private tank cars. It is believed that there may exist a multitude of other discriminations of great aggregate importance. So long (says the report) as State rates are not required to be made public, and shippers use them in combination with inter-State rates, all manner of devices to evade the purpose of the law are possible.

It would be bad enough if the charges against the Company ended here. But evidence has been given before the Inter-State Commerce Commission now sitting at New York as to most reprehensible action on the part of the Standard Oil Trust in crushing out small independent traders. Corruption of railroad employees and agents of independent oil companies, dishonest methods of procuring land leases, giving short measure, and selling three kinds of oil out of the same tank—are all charged against the Trust. One witness (for ten years an agent of the Trust, but now an independent oil trader) testified that cylinder oil was the most profitable sold; and the instructions to agents were "if we found a competitor selling this oil, to cut the price "so as to get the orders, and then to substitute an inferior "grade oil and guarantee it to be of superior quality." The evidence given as to short measure sounds incredible. It was not called by that name. "I was frequently," said a witness, "advised by agents of the Company that my "stock was not showing up as it should, and was told that "it was a simple matter to sell 205 to 208 gallons from "a 200-gallon load of oil. The Standard Company ex-"plained this by saying that the oil expanded in the "waggon!" It is but fair to point out that this is the testimony of a rival in business, and also that the general Counsel for the Standard Oil Company has expressed the opinion that the report on which President Roosevelt's strictures are founded is "absolutely unfair and unjust." It is, indeed, to be hoped, in the interests of honest trading, that the Standard Oil Company have some satisfactory answer to the serious accusations with which they are confronted. In any event, it will be a matter for congratulation if the present movement should result in freeing the American people from the incubus of a monopoly which only serves for the enrichment of the few at the expense of the many.

Parliament and the "Higher Efforts" of Municipalities.

The present head of the Government makes no secret of the fact that he at all events is determined to play up to municipalities for all they are worth. The Premier appeared at the dinner of the Association of Municipal Corporations the other night; and his postprandial oration was in large part an extended version of one portion of his General Election speech at the Albert Hall early in the year. Sir Henry professes a greater admiration for municipal administration than most ratepayers would be prepared to give utterance to; and before his after-dinner speech had gone far, his unctuous praise of municipalities must have made the representatives of those recently much tormented but now much favoured bodies swell with pride. It is not, we learn, municipalities but Parliament who require reforming. All that appears to be wrong about municipal institutions is that they need—so the Premier thinks—an easier, shorter, and cheaper way than at present for obtaining facilities for managing their own business. The accumulated evidence of recent years and the total of local indebtedness show that there has been too much ease in getting powers, and that this and the facilities for "managing" civic business has led to lamentable mismanagement. Shifting bodies such as local authorities, the members of which can throw off their responsibilities as easily as a Cabinet Minister can his Court coat, require not further ease and facilities, but rather more supervision. It is the duty of Parliament to see that a certain minimum level of service is secured to the people who live in our cities and towns under the rule of municipalities, but we cannot agree that above that minimum all should be infinite for the municipalities. That, however, is evidently the interpretation of the following passage from Sir Henry's speech: "It is the duty of Parliament to see that in the higher efforts of municipalities—in their, perhaps, more adventurous experiments—and in all the directions to which the genius of their rulers can be turned, they shall at least not be hampered and hindered by obsolete or unnecessary or galling restrictions, which prevent them from bringing their line of action up to the level of the requirements of the communities over which they have rule." It was a grand invitation to the municipalities to "make hay while the sun shines." The unfortunate thing is that the lessons of the past have not yet induced any moderation in such "higher efforts" as "adventurous experiments." Nor will they while the head of the Government fails to recognize where his responsibility lies in this matter.

Repayment of Loans.

Among the many modes by which the Association of Municipal Corporations would like to see the way made easier for their aspirations is in getting the Government to cause the Local Government Board and Parliamentary Committees to relax the views of late years in respect of the terms allowed for the repayment of loans. In many cases, the periods have, more especially in connection with perishable works such as tramways and machinery, been considerably shortened; and this will make for the healthier condition of municipal finance in the future. The Association have sought to impress their views on the Local Government Board. But the Local Government Board have only altered their practice on the strength of a long experience; and the President has declined to receive a deputation. Local Authorities have themselves to thank largely for the change of views of the Board, through not making proper provision for the renewal of subjects whose life has no relation with the length of term permitted for repayment. There are, of course, permanent works on which a fairly considerable term can be allowed. But even big works like dams and reservoirs and public buildings do not improve structurally with age; and mechanical and productive plant begin their depreciation from the day they are set in operation—not only in electricity works and tramways, but in gas, water, and other works. It is all very well to speak of unfair burdens upon the present ratepayers; but there would be greater unfairness in saddling future generations with the depreciated present preferences and perhaps (with the progress of invention) obsolete and uneconomical plant and works. Co-ordination of loans and greater length and uniformity of repayments periods are prayed for. How can there be anything like uniformity in view of the disuniformity in life and service of the subjects for which loans are granted? What the Local Government Board has been doing in limiting loans has commended itself to thoughtful men as one way of curtailing the flights of municipalities into what the Prime Minister calls "adventurous experiments." It is to be hoped the Board will continue a policy which their experience has shown is necessary.

Price of Gas for Power.

In the "JOURNAL" a fortnight ago, it was stated that the Huddersfield Town Council had agreed, by an overwhelming majority, to reduce the charge for gas for motive and business purposes to 1s. 6d. per 1000 cubic feet. At the time, the Labour members of the Council objected to the adoption of this course, on the ground that "the poor man was going to make the profit, by being charged heavily for his gas, so that another might have a cheap supply," or that "if the Corporation could sell gas at 1s. 6d., and make a profit, those who were paying more were being robbed." The Mayor strongly denounced this attitude, and it found no support from others than the Labour members; but it seems that the decision to reduce the price has since been the subject of at any rate some criticism. This has led the Chairman and Deputy-Chairman of the Gas Committee to address to the local Press a letter in which are set forth the various reasons which induced the Committee to offer the concession they have

done to manufacturers. The tale is a simple one. They found that orders for suction-gas plants were being eagerly sought in the town; and that the competition was of a kind which could not be ignored, if the financial interests of the Gas Department were to be studied. The same trouble has been encountered, and the same remedy adopted, in many places besides Huddersfield. Then they were convinced that the development of the trade of the town had been seriously retarded by the high price of gas for business purposes; and under these circumstances they adopted the not unnatural course of endeavouring to "abolish this hindrance to the welfare of the community." There are set forth the factors which enable the Committee to supply gas at the price named for these special purposes; and these are such as to make it quite evident to the Committee that it is the consumers for motive power and other trade purposes who render it possible for the small lighting customers to be supplied at the present low rates. More than that, they hold out the hope that the present concession to manufacturers will in the near future make practicable a further reduction (beyond that made on Jan. 1 last) to lighting consumers.

Gas Profits and the Rates.

In view of the renewed attention that is now being devoted in many places to the question of handing over large sums to the relief of rates out of the profits made by municipal gas undertakings, the protest entered by Mr. Duxbury is an exceedingly opportune one. Mr. Duxbury is a member of the Darwen Town Council; and it was, of course, to the practice in regard to this particular gas-works that he directed himself. Very much of what he had to say, however, would apply equally elsewhere; and for this reason we report his protest in full. Readers of the "JOURNAL" do not need to be reminded that the intimate connection which Mr. Duxbury has had with the gas industry renders him peculiarly qualified to speak with authority on all matters relating to it. Three years ago the Darwen Town Council passed a resolution to the effect that when the gas-works reserve fund reached £5000, the profits should automatically go to the relief of the rates. Such a course has much that can be said against it —and Mr. Duxbury said it all. That he was unsuccessful in getting the resolution rescinded, is greatly to be regretted; but though not immediately fruitful, his efforts will no doubt in time be productive of good. Such spirited protests as those of Mr. Duxbury and the Chairman of the Rochdale Gas Committee (which was referred to in last Tuesday's "JOURNAL") cannot be altogether in vain. Darwen, it seems, has in the past attached an unusually wide meaning—even for municipal traders —to the word "profit;" for in 1902, though the operations of the gas-works resulted in a loss of £3800, the Council nevertheless transferred £1000—and then raised the price of gas 3d. to make up the deficiency. Since then substantial net profits have been made; but the 3d. has not been taken off the price. So much for the argument that the gas-works belong to the ratepayers, "who have to bear all the risks and responsibilities of them"—the fallacy of which Mr. Duxbury made so clearly manifest. It is, of course, the gas consumers who have to take whatever risk there may be; and, as he shows, there is all the difference in the world between the ratepayers and the consumers when the effects of the price of gas and the relief of the rates are considered. It is to be feared that there are a good many people at Darwen, as elsewhere, who do not agree with the opinion of Mr. G. Bernard Shaw, in "The Common Sense of Municipal Trading," as quoted by Mr. Duxbury: "The object of municipal trading is not relief of the rates; if it were, it might be manipulated so as to throw the whole burden of local taxation on certain classes of consumers. . . . Its object is to provide public services at cost price."

Nottingham Gas Accounts.

There was quite a lively discussion on "budget day" in the Nottingham City Council, when the Chairman of the Finance Committee complained that they were obliged to "take a leap in the dark," owing to the fact that the Gas Committee had not submitted a complete statement of accounts regarding the past year's working. Under these circumstances, he felt himself compelled to follow the course taken twelve months ago, and "be content with the small sum of £27,000" out of the profits in relief of the rates. To most people the sum named would appear to be a very substantial one; but then the Chairman of the Finance Committee found himself in need of more money, and the only alternative to taking a larger amount than in the previous year from the gas profits was to increase the rates by 2d. in the pound. Even thus, however, it may be pointed out that the Gas Department's £27,000 is more than the contributions of the tramways and electricity works added together. An amendment was proposed that the Council should adjourn so that the exact amount available from the gas undertaking might, if possible, be ascertained before the rates were fixed; but this was subsequently withdrawn. The attitude adopted by the Chairman of the Finance Committee was strongly protested against by Mr. Harlow, who said that the Gas Committee (of which he is the Chairman) had been working extremely hard to give satisfaction to the town, and promised to submit in a short time a report showing what had been done to meet the complaints that had been made of the gas. This report would prove that something had been accomplished; and yet they were now charged with another offence. When, he asked, would these annoyances cease, and the Committee be free from harassing and irritation? Then he went on to say that the Chairman of the Finance Committee knew for certain that he was going to receive £27,000 from the profits; while rough accounts that had been made out showed that they had made a profit of at least £5000, and probably £7000 or £8000, more than this. From this he proceeded to range himself on the side of those who have, in other places, lately been advocating the claims of municipal gas-works reserve funds to earnest consideration; urging that it was only proper that a reasonable proportion of the profits should be placed to the reserve fund and written off for depreciation, instead of every farthing being taken for the relief of the rates. The sums which he thinks should be annually set aside for these purposes—£10,000 to reserve, and £5000 for depreciation—are by no means extravagant, when compared with the amount which it is proposed to hand over to the rates; and we are glad to see that the Chairman of the Finance Committee is in agreement with him as to the necessity of building up a strong reserve. If municipal expenditure must go on increasing, it is surely better that the extra demands should be met directly out of the rates, rather than that trading departments should be handicapped by being drained of their resources. There may be a temptation to keep down the rates by the adoption of the latter policy; but to resist it will, in the long run, prove the truest economy.

Future of the Gas Profession.

A few months ago, a long correspondence took place in the columns of the "JOURNAL" on "The Future of the Gas Profession." It is true the chief point dealt with by the writers of the letters was the desirability or otherwise of adopting the calling, from the point of view of remuneration only; but nevertheless one's mind naturally reverts to the subject on seeing one of the questions put to seven of the applicants for a recently advertised position as Manager and Secretary of a gas-works in a small country town. There were two queries only. The first was a pertinent one—"If appointed, when could you take up the duties?" But the second was exactly the opposite—"Are you a Churchman or a Nonconformist?" What the feelings of six of the applicants were on receiving this extraordinary demand for information, we do not know; but the seventh regards the letter sent him as a "fearful and wonderful curiosity." After stating that he is a Nonconformist —and adding: "You may also be interested to know that I am a vegetarian, an anti-vaccinator, an anti-vivisectionist, a peace-at-any-price man, and a red-flag Socialist"—he suggests that the instigators of the letter are "a source of great danger to the public, and should be put into one of the many institutions provided for such, and kept there during the term of their natural life." Without going quite so far as this, we can quite sympathize with the applicant in his disgust at having such a question addressed to him. What connection a man's religious opinions can have with his capabilities as a Gas Manager and Secretary (in which capacities alone he offered his services), is a mystery that mere mortals like ourselves find it impossible to fathom. But of one thing it is possible to be quite certain—and that is that the adoption of such inquisitorial tactics on the part of would-be employers cannot be regarded as likely to increase the popularity of the gas profession as a vocation.

NOTES FROM WESTMINSTER.

CONTESTED Gas Bills are getting scarce; and in the second House, there will be but few claiming the consideration of Select Committees. We may therefore look for a comparatively quiet time now. But nevertheless a watchful eye has to be kept on proceedings, as here and there points of interest crop up which it is of importance should not be overlooked. In the following paragraphs examples will be found.

The Testing Clauses. When the Cheltenham Gas Company's Bill was before the Unopposed Bills Committee last week, it was stated by the Parliamentary Agent that he understood that draft clauses relating to the testing of gas were under consideration, but that they had not been settled. As a matter of fact, however, the draft clauses have been remodelled; and one of the principal provisions arranges for the use of the bar photometer, so that it will not be necessary in the case of suburban and provincial companies coming under a method of testing that will do full justice to the gas they supply to do more (unless they otherwise prefer) than provide themselves with the Metropolitan No. 2 burner and a 10-candle pentane lamp, and follow the prescriptions of the Gas Referees as to their use. It would have been an unnecessary proceeding, and a hardship, to have a wholesale scrapping of bar photometers throughout the country. Further reference is made to the matter in our editorial columns; and the draft clauses, as amended, appear in our "Parliamentary Intelligence."

South Suburban Gas Bill. In the editorial columns recently, we had the pleasure of announcing that an agreement had been effected between the opposing authorities and the South Suburban Gas Company over the Bill which the latter have in Parliament. The measure came before the Unopposed Bills Committee during the week; and the main features of the agreement received publicity. It will be seen that the terms are fair to all parties. The original proposal was that the illuminating power of the gas should be reduced from 15 to 13 candles; it is to be 14 candles. The sliding-scale, however, as applied to the Company has undergone change. Instead of the old neutral zone in the standard price between 2s. 10d. and 3s. 2d., a fixed standard of 2s. 9d. has been adopted; and the fluctuations in the dividend will be on a 1s. 8d. basis per 1d. reduction or increase. What this represents can be gathered from the evidence of Sir George Livesey, as published in the "Parliamentary Intelligence." The Company and the Local Authorities are to be congratulated upon this amicable settlement, though the latter do not appear to have gained more than they could have obtained long since without causing the waste of money which the consumers have had to provide.

Public Lighting Clause. The Bill of the Derby Gas Company, which proposes, among other things, to acquire certain neighbouring gas undertakings has been before the Unopposed Bills Committee, and has commended itself to them. There is only one matter to which it is desired to specially direct attention. The Derby Corporation deserve praise for having in their agreement with the Company consented to the modification of the public lighting clause of the Company's Act of 1852, by the insertion of the words "for lighting purposes," which give proper definition to the original intention of the clause—that is to say, the Corporation are not to be charged a higher price for public lighting than the lowest price charged to any consumer of gas for lighting purposes; but the maximum is not to exceed 2s. per 1000 cubic feet. The Unopposed Bills Committee have allowed the clause. The fair-mindedness of the Derby Corporation has striking contrast to the action of the Hull Corporation in connection with the Sutton, Southcoates, and Drypool Gas Bill, upon which comment was made in the editorial columns last week. The Derby Company also secure freedom from the restrictions as to sulphur other than sulphuretted hydrogen; and for testing purposes they are also to have the new Metropolitan No. 2 burner. Sir George Livesey advised the Company in reference to the clauses of the Bill. Both the Company and Mr. J. Ferguson Bell are to be congratulated on getting their Bill through without alteration.

Municipal Wiring and Hiring. The Electrical Contractors' Association are going to oppose in the House of Lords the wiring clauses of the London County Council (General Powers) Bill. It will be remembered that they did not take part in the opposition in the Lower House. It is difficult to know whether recent events give the Association encouragement or otherwise. The Lords are showing a decided objection to having the fads and fancies for this and that of the Lower House stuffed down their throats; but, on the other hand, Earl Lauderdale's Committee lately, in spite of the opposition of the Gas Company, declared proved the preamble of the Newport Corporation Bill, one of the proposals of which is the carrying on of business in the hiring of electrical fittings, motors, &c.

Parliament and Private Bill Finance. It has been observed, in connection with the proceedings before the Unopposed Bills Committee, that the financial powers asked for by promoters have been scrutinized very carefully; but the spirit of close investigation in this regard appears to be running in the whole of the parliamentary channels through which Private Bills have to pass. Two or three instances of this occur in connection with Electricity Bills in the past week. Clause 42 of the London County Council Electricity Bill proposes that the Council shall have power to apply borrowed money in payment of interest. This has been condemned by the Select Committee on the Repayment of Loans. Under these circumstances, the Lords of the Treasury consider the application of the principle in the present case ought not to be permitted, unless exceptional grounds can be proved. Whether the Hybrid Committee will consider the arguments advanced are sufficient is a matter upon which we have to await a pronouncement; but we hope the action of the Lords of the Treasury, which plainly indicates their view, will be endorsed by the Committee refusing to allow the Council the power sought. There are precedents for what the County Council propose, in the Water Acts of Birmingham, Leeds, and Bedford in 1902; but Mr. Balfour Browne, K.C., points out that these Acts were passed before the Committee on the Repayment of Loans made their report. Then another case is that of the Derbyshire and Nottinghamshire Electric Power Company, who have a Bill in Parliament seeking to alter and regulate their capital and borrowing powers. Among other things, the Company asked to be placed somewhat in the position of a Limited Liability Company, with shares payable to bearer, &c. It is thought that this will facilitate the raising of capital, and increase the marketability of the shares among foreign investors. We have not the full clauses before us; but they have not commended themselves to the Unopposed Bills Committee. It is feared by them that the clauses would enable the promoters to start practically separate companies, or separate classes of shares applying to separate generating-stations, and that the effect of this would be where a prosperous station in one district had reached its maximum statutory dividend, the balance of profits beyond would be applied to starting new stations in other districts, and not to the reduction of the price to the consumer. The Committee, desiring to take these matters more carefully into account, have adjourned consideration of the clauses *sine die*. Again, Parliament has been asked to include, within the area of the Shropshire, Worcestershire, and Staffordshire Electric Power Company, Birmingham and several adjoining places, and to give to the Company extensive capital powers. Lord Brougham and Vaux's Committee have had the Bill before them; and they have insisted upon some guarantee, stronger and more tangible than mere expressions of opinion, that the capital could and would be raised. The Committee had also to have some assurance that the Bill would not be treated as a marketable commodity. In the result, a clause was inserted, providing that the powers should cease, unless £300,000 was *bonâ-fide* subscribed and paid up to the satisfaction of the Board of Trade within eighteen months. Birmingham and Wolverhampton have been struck out of the Bill; but the Company have secured the right to lay mains through the excluded areas, in order to reach other districts. The Unopposed Bills Committee are also a little concerned over a proposal by the Metropolitan Water Board to raise money by means of bills (if they think fit) instead of by mortgages or the creation and issue of water stock. The Committee have mentioned the matter in reporting the Board's Bill.

The L.C.C. Electricity Bill. The rule of three days again applied last week to the sittings of the Hybrid Committee on the London County Council Electricity Bill; Tuesday to Thursday compassing the duration of the hearing of witnesses. Mr. Robert Hammond, Mr. J. F. C. Snell, and Mr. H. E. Haward were the chief witnesses, their evidence being supplemented by one or two representatives of Borough Councils who are desirous of obtaining a supply of electricity in bulk, and are willing to be tied to the apron-strings of the County Council. Mr. Haward having grown accustomed to dealing with the high finance of the County Council spoke of millions of pounds as though he was dealing with pence. Inasmuch as the Council have raised £33,000,000 during the past ten years, and their outstanding debt is the sum of £45,240,000, of which £38,500,000 is represented by unremunerative works, and in which is not included £18,750,000, the outstanding amount of the loans of the Council to the borough authorities, Mr. Haward regarded the £2,500,000 that it is proposed to expend on this electricity scheme as a mere bagatelle, or as he put it, "it is not a serious addition to the Council's commitments." That is what comes of this libertinism in local finance—millions in time become reckoned as trifles. But the £2,500,000 is not Mr. Hammond's estimate for the electricity scheme, though he is a witness for the Council. He reckons £3,268,055 (we are not sure whether he said anything about shillings and pence) as the cost of the undertaking; and if this is his calculation, it will be safe to say that it is not the end of the amount that will be required. Mr. Haward knows something of the needs of capital expenditure in electricity supply; and he argues that, if the Council do not spend this money, then they will have to provide it for the extension of the Borough Councils' works. We are not so sure about that, as a private scheme (without running the ratepayers into any risk) might be found to fully answer the requirements of bulk supply for the local authorities. Mr. Haward had to admit that he anticipated, in the early years of the undertaking, there would be a deficiency which would have to be met out of the rates. On this confession, Parliament ought not to allow the over-burdened ratepayers to be further oppressed. If a serious responsibility, as Mr. Haward put it, rests on the Council in sanctioning loans to the Borough Councils for electricity supply, and objection is felt to lending

more money (it already amounts to a round 5 millions) for this purpose, the responsibility on Parliament in allowing the County Council to indulge in a speculation of this unknown character and extent is even more serious. The reports of the Finance Committee of the Council, which it will be remembered were adverse to the scheme, have been in evidence during the week; but Mr. Haward excuses the Committee's conclusions by stating that they had not the whole of the details of the scheme before them. The opposition to the Bill was opened by the Willesden Borough Council, who feared that the County Council would be brought into unfair competition with the North Metropolitan Power Company, who supply the Borough Council in bulk.

The Sulphurous Acid from Burning Coal. The memorandum from the Commissioners of Works as to the emanations of the shafts of electricity generating-stations was brought forward during the sittings of the Hybrid Committee. We have heard of "fumes" having been "seen" by electricians coming out of the tops of incandescent mantles; but we have our own views as to the electricians who saw those fumes being at the time a little out of condition. Perhaps we may be forgiven for thinking, after what Professor Thorpe told the Committee last week, that the products of combustion from an electricity generating-station are more undesirable in the atmosphere than incandescent mantles "fumes." There seems to be some idea floating about in Mr. Robert Hammond's mind that the generating-stations of the London County Council will not be such great offenders in regard to pernicious discharges into the atmosphere as are the existing generating-stations. What secret, we wonder, is in the possession of the Council that their generating-stations should behave better than other people's? Mr. Hammond is also of opinion that whatever the generating-stations do in the way of polluting the atmosphere, the smoke nuisance will be reduced by the rush there will be for the Council's electricity. Dr. Thorpe made some interesting points in dealing with the effect of the burning of coal on plants, which our electrical friends may take note of when next they have something to say about the effect of burning gas on plant life. Dr. Thorpe took the case of the proposed Battersea station, where some 240,000 tons of coal will be burned annually; pointing out that as coal contains about 1 per cent. of sulphur, which in burning gives twice its weight of sulphurous acid, it means that practically every hundredweight of coal gives about 2 lbs. of sulphurous acid. This finds its way into the air and eventually is brought down by the rain and affects vegetation and buildings, by being converted into sulphuric acid. The suggestion he makes, in order to obviate the dangers referred to, are, in the first place, that the consumer of the coal should minimize the amount of sulphur by having the coal properly screened and hand picked. Of course, this is already done to an extent in order to get a certain calorific value and a reasonable proportion of ash. In addition, Dr. Thorpe suggests that the amount of sulphur in the coal should not exceed a reasonable proportion, and further that a small amount of lime water should be added to the coal, by which means the quantity of sulphurous acid that escapes from the combustion would be minimized. In his view, the erection of large generating-stations will have the tendency to localize the products of combustion, and make their effect more serious in special areas. If the generating-stations could be placed away from London, all the better, says Dr. Thorpe, and that is one in favour of the St. Neot's project.

Portsmouth Water. Among our readers of the water engineering profession, there will be sympathy with the Portsmouth Water-Works Company over the position in which they have been placed in connection with their Water Bill, which has been before Lord Ludlow's Committee, and has had its most material part torn out for some undiscernible reason. The Company is a great one, doing large service in a town and district of the utmost importance, and also under obligations to supply water to the Admiralty up to a specified quantity per day. The population under supply numbers 219,000; and it is fast increasing. But certain of the Company's springs show a falling off; and in various parts of the area in which the Company have power to distribute, the people are becoming discontented with their own deficient and impure wells, and are asking the Company to come to their relief. Under the circumstances, it was necessary that the Company should come to Parliament for powers to obtain further sources of supply, and carry out a new pumping scheme. They therefore asked for a capital of £300,000, of which £169,000 is the estimated cost of the pumping scheme. In their dealings, fairness has always characterized this Company; and they announced their intention of looking after the supply of the people from whose district they took water. The opposition to the scheme turned up in great force; but one by one they dwindled away until the only public authority remaining was the West Sussex County Council. This Council, the London, Brighton, and South Coast Railway Company, and a body of landowners were the only people antagonistic at the close. The Portsmouth Corporation were at first nominally on the opposition side. The purchase of this concern has been a strong point with them for many a year; and five years ago they actually struck a bargain with the Company, but the ratepayers declined to consent. In their petition against the Bill the Corporation again spoke of purchase; and again an understanding has been arrived at, to the effect that a Purchase Bill should be introduced next session, but if one is not promoted, then the Company are to remain in possession of their property. The Corporation, on this understanding, continued before the Committee, but in support of the Bill. The private opponents pleaded the depletion of their own sources of supply if this scheme was carried through; the Railway Company fought tenaciously over a large spring in which they are interested; and the West Sussex County Council contended that the Company were asking possession of resources that they themselves might want some day. But the weight of evidence was distinctly in favour of the Company; and, on the ground of public policy alone, they ought to have got the powers sought. Mr. Herbert Ashley (the Company's Engineer), Mr. Joseph Quick, Mr. William Whittaker, and Professor Percy Frankland were among the expert witnesses called by the Company; while Mr. Baldwin Latham appeared for the opposition. Although the scheme was lost, other parts of the Bill were allowed to proceed. Perhaps the Corporation will now reconsider their position in connection with the question of purchase; for what it was necessary for the Company to do, it will assuredly be necessary for them likewise to carry out.

South Lincolnshire Water Bill. An agreement has been come to between the South Lincolnshire Water-Works Company and the Spalding District Council in connection with the Bill of the former. The Council have arranged to lay a new water-main between Spalding and Bourne, at an estimated cost of £14,000, which sum the Company are to repay by annual instalments. The Company are also to pay to the Spalding Council 3d. per 1000 gallons for the water supplied, the annual payment to vary from a minimum of £91 to a maximum of £350. By a former agreement, the new main was to terminate in the Market Place at Spalding. It is now proposed that the main shall go direct to the water-works; the Council paying the Company the extra cost, not exceeding £500.

LONG FLAME ARCS.

A PAPER on "Long Flame Arcs" has recently been read before the Institution of Electrical Engineers by Mr. Leonard Andrews; and some of our journalistic friends who deal in ephemeral literature have since gone into greater ecstasies over the long flame arc than have our friends of the electrical industry. The "Times" has pronounced its benediction, has spoken in rapturous terms of the progress of electric lighting, and has exhorted gas people to look to their laurels. A Cardiff paper has also published an article, from which it would appear that the long flame arc is going to be the "rock of salvation" for the electric lighting industry; but in every line of the article can be traced the inspiration of the Corporation Electricity Department, whose fortunes require all the outside assistance procurable. It is stated in our Cardiff contemporary's article that "it was claimed for this new illuminant, at the meeting of the Institution of Electrical Engineers, that for public lighting the new type of arc lamp now perfected, and known as the long-flame arc lamp, is likely to put the gas mantle completely out of court." Also that "for illuminating power and cost in proportion, gas cannot hope to compete with this new type of arc lamp. . . . The new type of long flame lamp while consuming less energy, will give a light of between 5000 and 6000 candle power." Nowhere in the paper or the discussion were these things said. The statements, however, are evidently made in all good faith by this journalist on the *ipse dixit* of some interested person. Now this "new" lamp which has made this little passing excitement is the "Carbone" lamp, so named after its inventor; and the Cardiff journalist will no doubt feel a little disgusted with his informant when he learns that the author of the paper himself closed the discussion by admitting that "for street lighting, the Carbone lamp is not so good as the chemical carbon lamp;" and the "Electrician" says this Carbone lamp is "more suitable for the lighting of large interiors than a competitor of the chemical-carbon arc lamp for street lighting." And we may add that the interiors will indeed have to be uncommonly large for the accommodation of this lamp.

We are not among those whose generosity is so cramped that a word of congratulation cannot be passed to electricians on the advanced efficiency in illuminating power of their arc lamps for the energy absorbed. There were at the Institution liberal allusions to the great advances of high-power incandescent gas lighting; and one speaker expressed the hope that the activity of the gas industry would continue, as the energy in improvement in both industries had an impelling effect the one upon the other. But while the improvements that have been made in flame arc lamps have brought about a reduction of the watts consumed per candle-power per hour, the greater illuminating power of these lamps does not make them any the more suitable for ordinary street lighting. Immense illuminating powers from one centre restrict the use of the lamps to large spaces; and the greater the illuminating power, the higher must the lamps be hoisted to get anything like a distribution of the light, and for the comfort of those using the streets. On this point we can adopt the view of Mr. E. E. Hoadley, the Electrical Engineer of Maidstone, who, in the discussion at the Institution of Electrical Engineers, looked at the matter from the point of view of a central station engineer "who is responsible to *the ratepaying public* for the lighting of the streets in a town." He said: "The wattage

consumption of existing flame lamps—viz., 800 watts—was far too high for general use in the streets of the smaller towns. There were, indeed, very few towns where the streets were of sufficient width or importance to warrant the erection of such large units of light; and what he would like the people who were responsible for the introduction of flame arc lamps to consider was the production of a *reliable* lamp consuming about 250 or 300 watts." There are, of course, flame arc lamps which come near the consumption indicated by Mr. Hoadley; and for what they are worth, we may quote some figures published by Mr. W. H. Patchell, the Engineer to the Charing Crosss, City and West End, Electricity Company, showing the cost per 1000-candle-power-hour with current at 2d. per unit: Oriflamme lamp, 350 watts, 0·4d. per 1000-candle-power-hour; Weinert, 350 watts, 0·55d.; Excello, 470 watts, 0·57d.; Santoni, 420 watts, 0·7d.; Carbone lamp, 1000 watts, 1d.; open arc, 500 watts, 1·5d.; enclosed arc, 500 watts, 2d.; enclosed midget arc, 250 watts, 3d. It was elicited from Mr. Patchell that these figures do not include the costly chemical carbons with their short life, and that the figures are based on mean spherical candle power. But after all, the maximum candle power efficiency of a lamp in respect of its consumption is not the true criterion; the real standard for judgment is the *useful* efficiency compared with total cost.

Regarding this lamp of Mr. Carbone. It is not so new as our daily contemporaries appear to imagine. It was exhibited quite three years ago at Hastings; and since then it has been commercially developed in Berlin. In the first table in the paper, it is seen that Dr. Wedding gives the following results of a test: "Carbone H. T. arc 9·3 ampères; 89·1 volts; 820 watts; mean hemispherical candle power 2080." But the efficiency is not so great as is attributed to the chemical carbon arc lamp; and in regard to all these tests information is required (among other points) as to the character of the carbon used, because as Mr. Haydn T. Harrison said in the discussion, the type of carbon affects the candle power of an arc lamp probably as much as anything else. If a high quality soft carbon is used in the Carbone lamp, it would be unfair to compare it with tests made with carbons that people can afford to use under practical conditions.

Returning to the paper, it is pointed out by the author that, in regard to the question of long arcs *v.* short arcs, it is an interesting fact that all the marked improvements that have been made in arc lighting during recent years have been effected by increasing the length of the arcs to from 10 mm. to 15 mm.; and investigation shows that the great improvement in efficiency is directly or indirectly due to the increased length. The improvements effected may be summarized as follows: (1) The formation of the positive crater in such a position that none of the light emitted by it is obstructed by the negative carbon; and (2) the impregnation of the carbons with metallic salts, thereby rendering the flame highly luminous. It is shown by photographs, diagrams, and words that, in ordinary arc lamps, a very large proportion of the total light emitted by the positive crater is intercepted by the negative carbon, and that the waste from this cause occurs in the direction in which, for many purposes, it can least be spared. Various attempts have been made to get an unobstructed positive crater by the use of inclined carbons. But all these experiments appear to have been carried out with pressures of from 40 to 50 volts across the arc; and, at these pressures, the crater forms on the side of the positive carbon between it and the negative, instead of at the tips, and consequently, at pressures of less than 60 or 70 volts, more light is intercepted by the negative carbon with inclined carbons than with carbons arranged in the ordinary way. This is the direction in which Mr. Carbone has been working; and he came to the conclusion that the solution of the difficulty was the use of inclined carbons combined with a pressure of from 80 to 90 volts across the arc. It is also said that he has discovered a method of controlling the long arc without flickering, and has succeeded in obtaining a form of flame which reduces to a minimum the absorption of the light from the crater by the arc mist. One difference between the Carbone and other flame arc lamps lies in the magnetic control of the arc; and consequently this adds to the complication of the mechanism. Mr. Andrews made a considerable examination of the material at his disposal to ascertain to what extent the efficiency of the Carbone arc is directly due to the fact that the higher voltages cause the crater to form more at the tips of the carbons than at the sides. The photographs which he exhibited made it clear that, to form the craters at the tips of the carbons, a pressure of from 80 to 90 volts is required, but that no useful improvement in the position of the craters is obtained by increasing the pressure of a 9 or 10 ampère arc above 90 volts. The deduction from all Mr. Andrews had to advance is that the high candle-power efficiency of the Carbone lamp is, in a great measure, chiefly due to none of the crater light being intercepted by the negative carbon. There was a great deal that was theoretical in the paper; but very little that assists to a conclusion as to the practical value of the Carbone lamp. But the statements already quoted show that it is not, at any rate, considered a useful lamp for street illumination.

There is nothing like getting an expert who has his own particular preference to pick to pieces other productions; and Mr. Andrews in his paper gave an excellent lead to the discussion when he dealt with the improvement in arc lighting due to the impregnation of carbons by metallic salts—that is to say the ordinary types of "flame" arcs. We find him in the course of the paper saying: "The efficiency of a chemical carbon lamp is so very much higher than it has yet been possible to attain with any type of pure carbon arc, that it might appear at first sight that the use of pure carbons would very soon cease. Unfortunately, however, the advantage from the point of view of efficiency is discounted by certain defects which render this type of lamp unsatisfactory for many purposes." The carbons are now usually of the composite type, consisting of three zones. The outer zone or envelope is composed of pure carbon, giving mechanical strength; the next contains carbon mixed with various salts, such as those of calcium and magnesium; and the inner soft centring core is made of the same materials, less strongly compressed.

The defects of the flame arcs may be summed up thus:

The flickering noticeable in all chemical carbon lamps cannot at present be entirely overcome, though it has been greatly reduced in recent lamps.

The "poisonous" fumes given off by the burning chemicals make the lamps unsuitable for use in a room not very efficiently ventilated, besides which these fumes are very apt to injure the mechanism of the lamp.

The ash or residue from a chemical carbon arc is very much greater than from a pure high voltage flame arc lamp. Experiments by the author show that, comparing the ash from a 10-ampère chemical carbon arc and a 10-ampère "Carbone" pure carbon arc after two hours' burning, the ash from the former was "many times greater" than that from the latter.

The carbons are at present considerably more costly than pure carbons; and as the globes cannot be entirely enclosed, the life of the carbons is very short.

The light is useless in positions where discrimination of colours is required; but it is noticed that Mr. Andrews considers there is nothing more pleasing than the chemical carbon lamp for the outsides of theatres, &c., especially where built of stone. His opinion is that the "Carbone" lamp gives the nearest approach of any lamp to a pure white light; but Mr. A. P. Trotter is of opinion that the lamp, by comparison in daylight, would show that it is yellower, and not whiter than the ordinary arc lamp.

These various defects of the flame arc lamps were also noticed in the discussion; but there are some interesting points in the concluding parts of the paper regarding the distribution of light which must not be passed over. It is well known that at least 40 per cent. of the light of an arc lamp is intercepted by the opalescent globe. This waste with the ordinary arc lamps appears to be necessary, in the first place to prevent the dazzling effect which would result from an unscreened arc fixed at a position that comes within the natural angle of sight, and, in the second place, to give, or attempt to give, a diffused light, or the effect of a light emitted from a large surface. In the case of an ordinary arc lamp, the bulk of the light is emitted at angles of less than 60° below the horizontal; and it is therefore necessary to place such lamps "comparatively near the ground"—that is, "comparatively near" as meant by electricians—to get efficient results from them. In the case of long-flame arcs, the maximum light is directly below the arc; and therefore it is advocated that the lamps, for such purposes as the lighting of large buildings, should be placed 30 or 40 feet above the ground! and less densely-obscured globes used. If the layman only understood something as to the fundamental law of photometry, he would grasp where in electric arc lighting, with these necessarily high-placed lamps, there is great waste of light at heights where he has no use for it; and he would also see how it is that, as we have so frequently contended, it is fallacious to take the nominal candle-power of these lamps and work-out costs to candle-power-hour to show a superiority in the matter of cost. The *wasted* as well as the *useful* candle power has to be paid for. Consider the points (drawn from Mr. Andrews' paper) in the opening lines of this paragraph, in conjunction with the following simply expressed lines from Dibdin's "Practical Photometry": "Light proceeds from a given radiant in all directions in straight lines. Consequently, it follows that, as these lines recede farther from the starting point, they separate more and more, and thus a less volume of light impinges upon a given object the more remote its distance may be; and this reduction is in inverse ratio to the square of the distance." This bears upon the question of high-placed and widely-spaced lamps. With lamps, therefore, that must of necessity be placed at a greater altitude, a vast amount of the light paid for is expended where it is not required.

Mr. Andrews' paper and the discussion claimed two meetings of the Institution; and we hope next week to have an opportunity of directing attention to some of the points in the discussion which bear upon the defects of the flame arc lamps. Meanwhile, we think readers will agree, from this review of parts of his paper, that Mr. Andrews has proved that the long-flame arc or the chemical-carbon lamp is not such a serious competitor to high-power incandescent gas lighting as some of our non-technical journalistic friends would have the public believe. At the same time, it would be folly not to recognize that the newer forms of lamp will appeal to those who set showiness above useful efficiency and economy. Above all, be it noted, that the Carbone long-flame arc is no good for street lighting, as it was supposed to be by certain writers.

ELECTRIC LIGHTING MEMORANDA.

A Flapping of Wings—The Local Government Board Anger Electricians—The Board's Electrical Experts Convinced that Incandescent Gas Lighting is the Cheapest for Street Illumination—Gas Companies and Electrical Competition.

THE electric lighting people have had a success in competition with gas; and we do not grudge them it. Gas has had many successes, and hope to have a great many more. Of course, some people have preferences which it is very difficult to depose. The success of electricity is in connection with the Charing Cross Station; gas has had recent successes in competition with electricity at the old and new Victoria Stations of the London, Brighton, and South-Coast Railway, and at Broad Street Station—beating electricity out-and-out in the matter of cost. Mr. Patchell, of the Charing Cross, City, and West End Electricity Supply Company, announced the glad tidings at a meeting of the Institution of Electrical Engineers the other day; and he thought electricians might be allowed to "flap their wings" over it. If electricians have wings to flap, they are quite at liberty to indulge in the innocent pleasure. It will be remembered that, when the roof of Charing Cross Station collapsed, the Charing Cross Electricity Company rendered great service by bringing electric search-lights to bear upon the work. This much-advertised service has no doubt, as is only natural, produced a friendly feeling between the responsible officials of the Railway and Electricity Companies. When the question of lighting the restored station came up, the Gaslight and Coke Company, according to Mr. Patchell, persuaded the Railway Company to allow them to show what they could do with eight Sale-Onslow high-pressure gas-lamps; and the Electricity Company put five Oriflamme lamps in competition. Mr. Patchell says that "price for price, they beat the Gas Company hollow"—"on the basis of price for price, the electric arcs gave 45,000-candle power, as against 20,000-candle power for the gas-lamps." Mr. Patchell did not explain what he means by this; and more information will be required before the bare statement can be taken as a flawless representation of a fair and square victory. When he speaks of electricity having beaten the Gas Company hollow price for price, we remember that this same gentleman has before given evidence of having been "stung to the quick" over the keenness of the Gas Company's competition; we remember also that the Chairman of his Company at the last meeting of the shareholders had to confess that the Gas Company's competition was doing them no good; and we have a recollection, too, that the shareholders of Mr. Patchell's Company have had to be content with a lessened return on their investment in the concern. Therefore, the Electric Company must badly want to create a little sensation; and it is just possible that they are doing this lighting at Charing Cross Station at a price for the sake of the advertisement they will get from it. Until there is something definite known on this head, and until it is known what the price includes, we can afford to suspend acceptance of Mr. Patchell's loose assertion that "price for price" his Company have on this occasion "beaten the Gas Company hollow." Something about flame arc lamps appears in an article in another column; and it is also reported that the local authority at Chelmsford are very discontented with the performance of the flame arc lamps in their streets.

But while Mr. Patchell is flapping his wings over this lighting of a railway station, electricians have been stirred to indignation by the fact that the Local Government Board are not to be befooled, by costs per candle-power per hour or per annum, into believing that electric arc lighting is the cheapest means of street illumination. They know, through municipal accounts, how this so called "cheapest light per candle-power" has universally run up the cost of street lighting, to the injury of the ratepayers, by hundreds and thousands of pounds per annum in proportion to the extent of its adoption. Time and again the Inspectors of the Board have warned local authorities of this common experience in the hope that it would restrain; but electricians and local authorities have comforted themselves with the belief that these warnings were merely the expressions of individuals. But now it has transpired that they represent the deliberate, and deeply-rooted view of the central authority; and suddenly we find the electricians up in arms against the right of the Board to advise local authorities in this matter. It is our impression that the Board have every right to assist in protecting the ratepayers against extravagance. They are applauded for exposing "scandalous ignorance and mismanagement" in municipal trading departments; but in the department of public lighting, the "scandalous ignorance and mismanagement" is said to be no affair of the Board. We differ from the electrical dictum, and assert that the Board are in an exceptionally good position to qualify them to speak authoritatively as to the waste of public money occasioned by street electric lighting. At Bridlington, recently, Mr. Hooper, one of the Board's Inspectors, in holding an inquiry into an application for a loan for electric lighting purposes, stated that his experience was that incandescent gas-lamps were the best and cheapest for street lighting; and municipal expenditure on public lighting everywhere justifies his statement. This so incensed the Chairman of the Electricity Committee (Mr. Mainprize) that, at a succeeding meeting of the Council, he made the somewhat rude suggestion that the Local Government Board had not sent down their Inspector to air his opinions on the subject of the relative merits of the lights for street illumination; and it certainly hardly came within the scope of the inquiry. The Bridlington electricity undertaking, be it known, has not yet quite made income meet the outgoings; but the ratepayers are consoled with the assertion that, since the Gas Company have had a competitor, the price of gas has been lowered 20 per cent. Reductions in the price of gas have been throughout the country common since the prices of coal have been easier than those ruling a few years since; so that the substantiation of the claim as to the beneficial effect of the Electricity Department would be a little difficult.

From what transpired, however, at an inquiry at Newcastle-on-Tyne last week, the Local Government Board apparently do not endorse the views of Mr. Mainprize, of Bridlington. The inquiry at Newcastle had reference to the borrowing of £4500 for further lighting by electric arc lamps; and the Inspector was Mr. R. H. Bucknill, M.Inst.C.E. The proposal is to add 180 arc lamps to the 200 at present in use; and the Tramways Department are prepared to reduce the charge over the whole from £15 10s. to £11 per annum. It was stated in evidence that, at the first-named figure, there was only "a fair margin of profit;" and at £11 only "a small one." Still the annual charge for the 380 lamps would amount to the substantial sum of £4180. The remarks made by Mr. Bucknill, in the course of the inquiry, are conclusive evidence that the Inspectors are the mouthpieces in this matter of the Local Government Board. Here are quotations from the report of the proceedings:—

> The Inspector said the Local Government Board had been refusing loans for electric lighting by reason of the extra cost, as compared with gas. He quoted a case where the comparative cost was 1 in the case of gas, and 1·74 in the case of electricity. The Board had desired him to go very carefully into this—to take any figures the Council's Engineer cared to give him with regard to generating and distributing charges. Then he should have to know the comparative cost of gas.

And again—

> The Local Government Board was under the impression that no station yet had been able to supply electricity to give as good a light as incandescent gas, at the same price. The matter had been gone into very carefully by the Board's electrical experts. It would be necessary that the applicants should show that they could give as good a light, and at the same price, as by gas.

The Inspector's remarks are fully vindicated by the facts of this Newcastle case. On turning back to the report that was made to the Council on the subject some time since, it is found that, notwithstanding the charge is to be as low as £11 per annum, the cost for the 180 lamps, giving 126,000-candle power, would be £1980; while the estimate of lighting by gas was £841 for an aggregate illuminating power of 61,800 candles. Multiplying the figures for gas by 2, it is seen that for £1682 (if the light were really necessary) the Gas Company could give 123,600-candle power—a reduction of £300 upon the "very small profit" quotation of the Tramways Department. Besides which, the useful efficiency of the electric lamps would not be represented by anything like the 126,000 candles referred to.

Competition is good in some respects, but not in all. In the case of a municipality, for instance, carrying on the supply of electricity on considerable loans for which the ratepayers are responsible, the business becomes a very precarious one for the latter if a company are allowed to come in and compete in any one respect for custom which the local authority may be well able to supply. Gas companies are large ratepayers; and they have a greater interest than any other ratepayers in doing their utmost to stop this kind of competition—in the first place, because the more it injures a local authority's business, the more likely are the gas company to suffer through the contribution they will have to make to the local exchequer; and, in the second place, because they will themselves have to face two competitors with prices cut to secure business. It is therefore highly necessary that gas companies should, being among the most interested of ratepayers, keep a watchful eye on electrical projects which may threaten in this way, and even assist the local authorities to resist invasion. The Newcastle-upon-Tyne Electric Supply Company's Bill in Parliament this year supplies a case in point. Against the Bill the Tynemouth Corporation and the Tynemouth Gas Company lodged petitions, and would have appeared if the promoters had not considered it wise to come to an agreement with the Corporation, which rendered further opposition by the Gas Company unnecessary. The Newcastle Electric Supply Company were seeking authority to enlarge their territory, acquire certain undertakings, and to supply electricity for power purposes in the borough of Tynemouth, although the Corporation have already installed electricity works. The Company sought not only to supply electricity for power purposes in the borough, but to allow those industrial establishments who patronized them to use for lighting purposes a proportion of the energy taken. This indicates how it would have been possible for this outside Electricity Company to come in and injuriously affect, by cutting prices to obtain business, the undertakings of both the Corporation and the Gas Company, and probably produce a loss on the municipal electricity undertaking which would have to be made good out of the rates. The Gas Company were therefore going forward in opposition to the Electricity Company's proposals; and they retained Messrs. William A. Valon and Son to give evidence in connection with the matter. The Gas Company, in their petition, submitted that, if the powers were conferred upon the Electricity Company, they (the petitioners) would be subjected to acute competition, which would be

rendered all the more severe by reason of the fact that there was nothing in the Bill to preclude the Company charging unfair preferential prices for the energy supplied by them in individual cases. The Company also stated that they were apprehensive of their position as ratepayers in the event of competition between the Electricity Company and the Corporation. They are, in fact, at the present time one of the largest ratepayers in the borough; being assessed at no less than £7320; and the rates paid by them amount to not less than £2674. Of course, it is not contended that gas companies should not be subjected to competition in the supply of power; but it is not fair or just that they should be called upon to meet increased competition, and at the same time be liable to find a portion of any loss sustained by one of the competing undertakings. However, in this case an agreement has been come to by which the Corporation will prevent competition by acting as distributors. On arranged prices, the Company will supply, through the Corporation, three-phase energy at industrial establishments where it is required in the borough, and will also deliver in bulk any electricity needed at the Corporation generating-station for ordinary distribution. The terms of the agreement are not of general interest, and as drafted they appear to be somewhat involved.

EXAMINATIONS IN GAS MANUFACTURE AND DISTRIBUTION.

By J. H. Brearley, of Longwood.

Three months ago, I had the temerity to make certain suggestions with respect to the examinations in "Gas Manufacture" held under the City and Guilds of London Institute. The correspondence, therefore, which has followed upon the papers set at the recent examinations has been to me of more than usual interest. One must perforce come to the conclusion that, as with the policeman of operatic fame, the Examiner's lot is "not a happy one." For my part, I must confess to a considerable amount of sympathy for that unfortunate individual, who, being "new to his job," must, through the shortcomings of inexperience (*vide* correspondence), be at this moment clothed in sackcloth and ashes. It will be far better, however, if the epithets are used sparingly, and attention calmly devoted to placing upon a better basis the *system* or *scheme* of examinations, to which, rather than the Examiner, any injustice (which, whether real or imaginary, must certainly be unintentional) must be due. If anyone questions this, be he "gas class" teacher or "gas class" student, let him impersonate the Examiner for a little while, and attempt to draw up a list of eight or ten questions that shall sufficiently and fairly traverse the scheme of the syllabus. It is impossible for an Examiner within these limits to probe accurately the depths of knowledge acquired by any candidate. The more he tries to do this, the greater will the injustice be to the candidate, for the less likely will he (the candidate) be to finish his task in the time allotted.

On this occasion, my sympathies go out to those aspiring young men who happen to be engaged in the distribution departments of a gas undertaking. A digest of the ten questions set at the recent examinations shows that in the honours grade eight questions referred to manufacture, works engineering, or laboratory matters, and only two related to matters of distribution. In the ordinary grade, the questions set were even more unfortunate for the outside man, since not a single question could be fairly considered as coming within the scope of "Distribution." Yet everyone admits that in recent years "Distribution," as compared with "Manufacture," has advanced in relative importance by leaps and bounds. Certainly, "Distribution" is now important enough to be separated for the purposes of examination; and it is due to the largely increasing outside staffs that such an examination should be instituted with as little delay as possible. If there were two (three would be better) grades for "Manufacture," and two grades for "Distribution," it would mean 40 questions set as against the present 20. Such a scheme would not prevent a young man ambitious enough, or intelligent enough, from attempting the two ordinary grades in one year; and, if successful, the two honours grades in the next year. Or he could combine the ordinary grades in one year, and devote the next two winters to the honours grades—one in each year. There would thus be the advantage that the brightest candidates could possibly get through in two years; while there would always be the option of spreading the work over three or four years. It would further have the advantage that the outside man would specialize upon the work he is actively engaged in, and make himself thoroughly competent therein so far as study will make a man competent, without troubling himself about works matters, which, however interesting they may be, will not make him worth any more wages per week as an inspector or outside superintendent. So, too, inversely, with the man employed on the works.

These examinations were surely never intended to be the sole preserves of those favoured with the education which is to be obtained by remaining at school till the sixteenth year. There are a large number of men engaged in the gas industry who had to begin work at a much earlier age than this. To these, the pace of the present examinations is "too hot." Again and again have I noticed, too, men engaged in the outside departments attend (say) five or six lessons in "Gas Manufacture," and then drop away because there seemed to be so little in common between much of the ground covered and that which constituted their daily round or common task. For a number of years, the Company with which I am identified has paid the class fees of those employees who attend not less than twenty lessons in any allied subject, and sit for examination at the end of the session. But it is next to impossible to work up enthusiasm among the distribution employees with respect to the present "Gas Manufacture" examinations. I plead for something that will *win* this enthusiasm. Only a separate course for "Distribution" will meet the case. Surely more than an average of one question per grade per annum is needed to provide the proper incentive to our outside men to study. Although the present examinations are described under the heading of "Gas Manufacture," this title is a misnomer, for as far back as one cares to remember, questions of distribution have been included in those set to the candidates, though seldom, if ever, have they been limited to 10 per cent. of the total before this year.

One more reference to the recent question papers, and I have done. I hope I am able to look impartially on this subject. I am not an examiner, a teacher, or a student. Without expressing an opinion as to whether, under the present conditions of examination, the recent questions were or were not fair, it appears to me that credit is due to the Examiner for so setting them as to eliminate those who cram from those who think; or, to quote from the reference which I made to this matter in my Presidential Address to the Manchester Institution, "those who imbibe from those who assimilate."

Children's Cookery Competitions at Gas Exhibitions.

In another part of the "Journal" will be found a few particulars of an interesting and instructive experiment carried out in connection with a gas exhibition recently held under the auspices of the Wakefield Gas Company. On several previous occasions, the Company have afforded the consumers and citizens generally opportunities of inspecting the most modern appliances for utilizing gas for lighting, heating, and cooking purposes; and by means of cookery demonstrations they have shown housewives how their culinary work can be performed much more efficiently, and with far less dirt, by gas than by any other fuel. This time, however, it was decided to make quite a new departure. To Mr. Harry Townsend, the Company's Manager, who had the organizing and carrying out of the exhibition, occurred the idea of having, in conjunction with it, cookery competitions for the benefit of the children attending the elementary schools, and giving certificates to the most successful competitors. The Chairman of the Education Committee of the Corporation (Alderman Smith) was consulted on the matter, and he not only entered most heartily into the project, but consented to open the exhibition. Fifteen schools entered the competition; three children being sent from each to compete for the prize of a silver shield given by the Gas Company, and to become the property of the school winning it three times. Laundry competitions were also arranged. We congratulate Mr. Townsend on the satisfactory results which have attended his "happy thought;" for it drew from Alderman Smith the acknowledgment that the Gas Company had not only endeavoured to promote their own interests, but had shown a desire to do something in a practical way to advance the educational interests of the children in the city.

Gas Supply in Shanghai.

The particulars extracted from the last report and accounts of the Shanghai Gas Company which will be found in another part of the "Journal," show that the gas industry has taken firm root and is flourishing in the Celestial Empire. The Company has been in existence for forty-two years; and its operations in the past twelve months furnish evidence that it has attained considerable importance. The consumption of gas increased to the extent of nearly 64 million cubic feet, or 21·66 per cent.; and it was attended by two highly satisfactory features. Rather more than 7 million cubic feet were burnt to supply motive power, or 25·27 per cent. beyond that consumed in 1904; and a substantial proportion was employed instead of electricity in the French Concession, where the incandescent gas system displaced the other illuminant to the extent of close upon 86 per cent. The Company's Engineer, Mr. H. King Hiller, is quite alive to the necessity of having his works in a condition to meet the demands upon them, as will be seen from the particulars given of the extensions carried out and in progress, which include a high-pressure and a "booster" main, as well as compressor engines. All that is wanted now is for the consumers to show their appreciation of gas for heating purposes; but doubtless they will do this in time. That the Company are in the satisfactory position shown by the accounts is the more gratifying from the fact that the war in Japan interfered with their supplies of coal, and necessitated the importation of some from Australia; and they passed through a severe trial at the time of the riots in December. But they have a loyal and devoted staff, who stood by them faithfully; and not the least pleasant fact to notify in connection with the Company's progress is that while the shareholders received 14 per cent. dividend on last year's working, they did not fail to express in a tangible manner their appreciation of the special services rendered by the staff on the very critical occasion referred to.

HIGH-PRESSURE GAS DISTRIBUTION IN BERLIN.

An account has recently been sent to us, by Herr E. Körting, of the system which has been adopted for the supply of gas at high pressure to the Berlin suburbs of Steglitz and Wilmersdorf from the gas-works at Mariendorf.

According to the census taken on Dec. 1, 1905, the population of Greater Berlin amounts to 3,000,000; some 2,000,000 inhabitants being congregated in the central districts, and the remainder in the 29 outlying parts. During the last decade, the population of the inner portion of Berlin has increased at a constantly diminishing rate; but the suburbs have developed with a rapidity suggestive of the United States. This is well indicated in the accompanying table, which shows the growth of the population in the districts served by the Imperial Continental Gas Association.

Year.		Population.		Increase per Cent.
1891	..	86,600	..	—
1900	..	270,500	..	212
1901	..	283,200	..	5
1902	..	312,000	..	10
1903	..	342,500	..	10
1904	..	373,300	..	9
1905	..	409,600	..	10

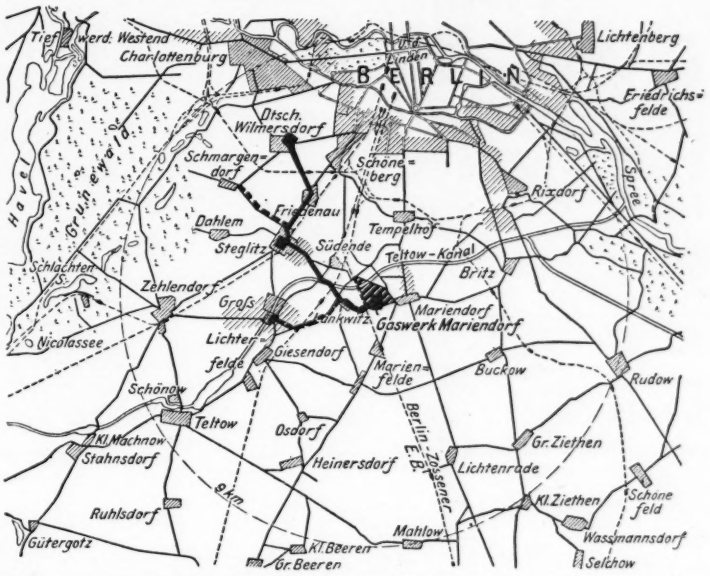


Fig. 1.—The General Plan of the District, showing the Extent of the High-Pressure Main.

The greater number of these suburbs are on the southern and south-western sides of the city, and are in places 8 to 9½ miles distant from the gas-works at Mariendorf whence they are served. In order that they should be supplied with gas at adequate pressure, it would have been necessary to lay a new main of very large diameter during the past year; but, owing to the great expense of so doing, and the demands already made upon the available space by the water-mains and the sewers, it was decided to take other steps. It was determined to leave the existing main untouched, and to carry a special high-pressure main from Mariendorf to the centre of each suburb, pumping the gas into the new main at an original pressure of some 39 inches, and reducing this to the ordinary town pressure at a governor-house in each district.

The general arrangement of the districts is shown in fig. 1. The high-pressure main has a diameter of 42 inches between Mariendorf and Lankwitz. At the latter place an 18-inch branch leads to the governor-house at Gross-Lichterfelde, and a 36-inch main proceeds to Steglitz. There another governor-house has been built, whence it is intended eventually to take a 20-inch branch to Schmargendorf. The final section of the main between Steglitz and Wilmersdorf is 24 inches in diameter. The whole length of the direct pipe is 5 miles 1067 yards.

The plant for compressing the gas has been erected in an addition to the governor-house at the Mariendorf works, and it is shown in figs. 2 and 3. Two Roots blowers A, driven by the steam-engine B, draw the gas from the common outlet F of the holders. When no supply of high-pressure gas is required, the bye-pass valve I of the plant is opened, and the engines are stopped. Gas then passes into the distributing main through the pipe H; the pressure being regulated by the governor C. In order to avoid any mishap through the attendant allowing the holder from which gas is being exhausted to become entirely empty, all the inlets and outlets of the holders are connected through the safety-valve E, which opens automatically directly the pressure at the blower-inlet falls below a certain fixed point. The action of the valve connects the outlet of the second holder to the blower; and therefore it is only necessary to make certain that two holders are always in action—the inlet of one and the outlet of the other being open. Should a holder become completely exhausted, the suction of the blower might rupture the bell crown.

Figs. 2 and 3 show the whole blowing plant, and figs. 4 and 5 one of the blowers in elevation and section. Each blower has a capacity equal to 7600 cubic feet per minute at an outlet pressure of 35·5 inches. The two blades of the blower with cycloidal faces

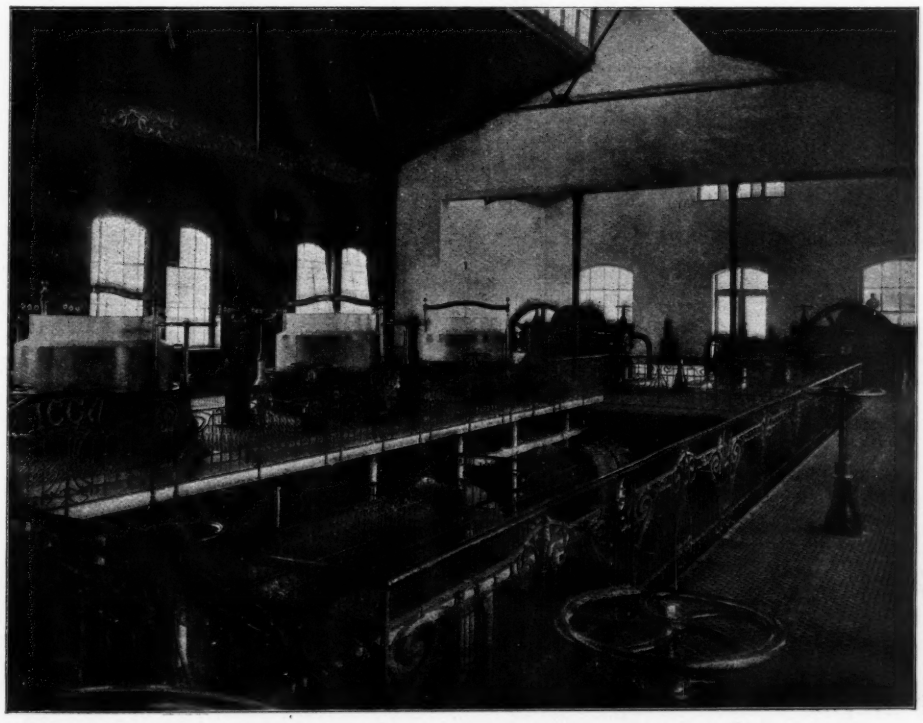


Fig. 2.—The Governor-House at the Mariendorf Gas-Works.

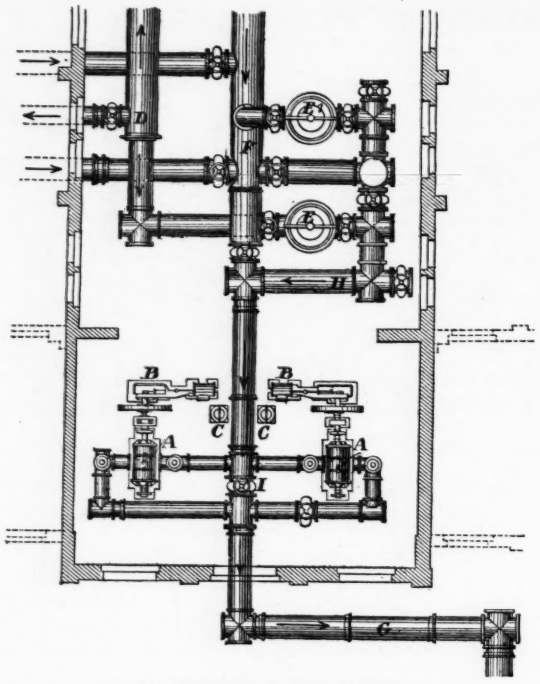


Fig. 3.—High-Pressure Pumping Plant.

A. Roots Blowers.—B. Steam-Engines.—C. Governors.—D. Pipe to Gasholder.—E E1. Safety-Valve.—F. Pipe from Gasholder.—G. High-Pressure Pipe.—H. Pipe to Distributing Main.—I. Bye-Pass Valve.

revolve at the same angular velocity in opposite directions, driving the gas forward in a direction perpendicular to the plane of their axes. To avoid wear and tear, a clearance of from 0·1 mm. to 0.2 mm. is left between all the moving surfaces. The spindles of the blades pass through stuffing-boxes in the blower casings, and are held in adjustable bearings, so that their positions can be set accurately. Each blower is coupled direct to its own steam engine, which is governed by a valve regulator C, enabling the pressure in the main to be set and maintained at any desired figure.

The gas travels through the high-pressure main, at a pressure of from 31 to 39 inches, until it arrives at the local governor houses. The house at Steglitz is shown in plan and elevation in fig. 6; its general external appearance will be seen from fig. 7. It contains a governor which reduces the gas to the proper pressure for distribution, irrespective of variations in pressure in the high-pressure main. The governor at Steglitz was constructed by Messrs. Parkinson and W. & B. Cowan, Limited, and has an inlet of 23·5 inches and an outlet of 35·5 inches diameter. Diagrams showing how accurately this apparatus works are given in figs. 8 and 9. Fig. 8 indicates the pressure at the governor inlet, and shows variations of from 1·6 to 2 inches; fig. 9 records the pressure at the outlet, maintained constant at 50 mm. (2 inches). The governor is provided with removable weights and with balanced twin-seated valves. It is impossible for the seal to be blown by any excessive pressure accidentally arising in the high-pressure main, because the inlet side of the governor is not connected with the water reservoir. At Wilmersdorf is a governor, constructed by the Berlin-Anhaltischen Maschinenbau Actien Gesellschaft, which has a 31·5-inch inlet and a 43·2-inch outlet. It has been erected in an addition to the local office—a plan having the advantage that it can be attended to by one of the office staff.

It remains to be ascertained whether the loss of gas and the loss of pressure per unit length of main are greater when large volumes of gas are sent to a considerable distance in this fashion in pipes of small diameter at high pressure than when they are similarly forwarded to the consumers' districts in large pipes at low pressure. The new installation at Berlin just described will enable these questions to be answered; and the author hopes to be in a position to report upon the subject on a future occasion.

The Rivalry Between Gas and Electricity.

The Engineering Supplement to "The Times" last Wednesday contained the following remarks, in the editorial columns, on the above subject: "It appears to us that the art of artificial lighting is now much in the same position as the art of making projectiles and armour plate. It cannot be disputed that the improvement of the incandescent mantle put electric lighting—from the standpoint of economy, at any rate—in a secondary position. The comparative cheapness and efficiency of gas, used in that form of lighting, was chiefly demonstrated by its employment in public thoroughfares, where the electric arc lamp was displaced for its more inexpensive rival. Yet it would appear that the time is coming, if it has not already arrived, when the electric light will again demonstrate its claim to superiority over any other form of artificial illumination, not only in its own peculiar advantages, but in absolute cost as well. Briefly speaking, we are within view of an incandescent electric lamp which will prove more economical, light for light, than the incandescent gas-mantle under the most favourable circumstances; while . . . for public lighting the new type of arc lamp now perfected [the 'long-flame' arc] is likely to put the gas-mantle completely out of court. There is a very large margin to work on in the improvement of artificial lighting, considering how minute a proportion of the energy employed in producing light is utilized; and although we have not, perhaps, yet attained the absolute in the perfection of gas lighting, that industry has a formidable prospect in front of it, in view of the recent successful inventions in the use of electricity."

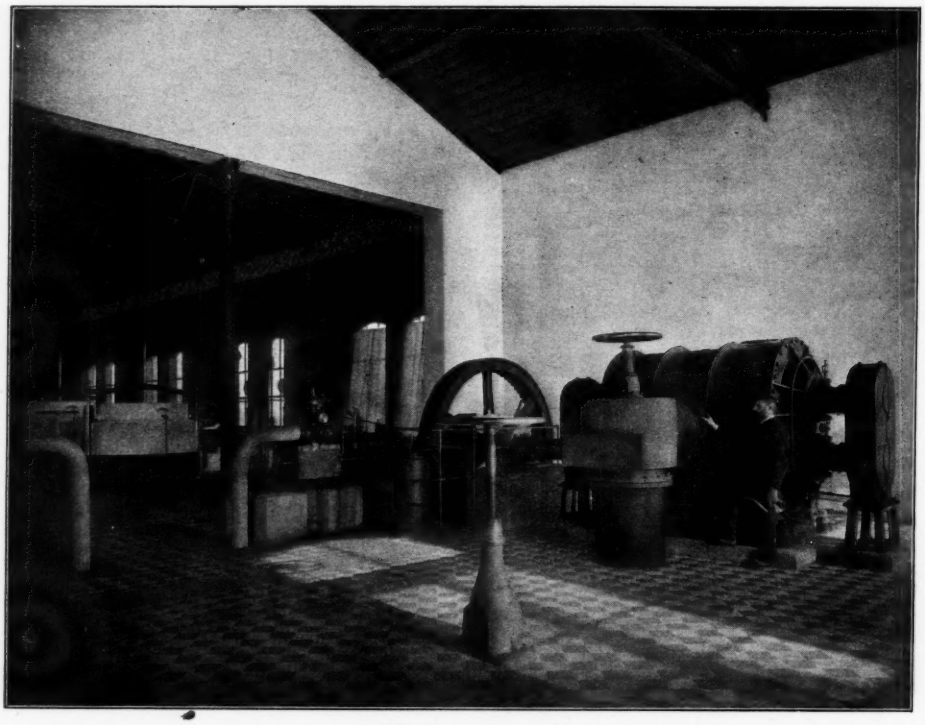


Fig. 4.—The Extension of the Governor-House, showing the Arrangement of the Blowers.

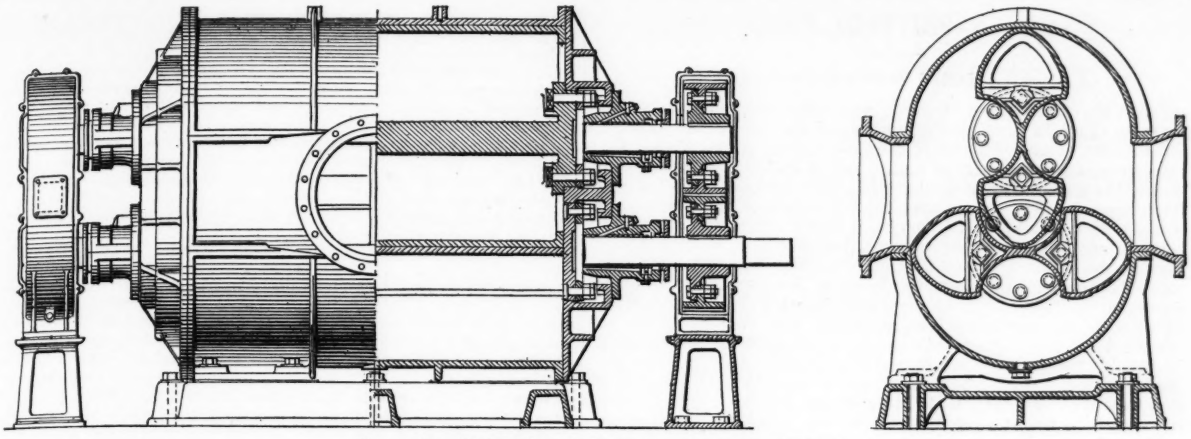


Fig. 5.—Longitudinal and Cross Section of Blowing-Engine.

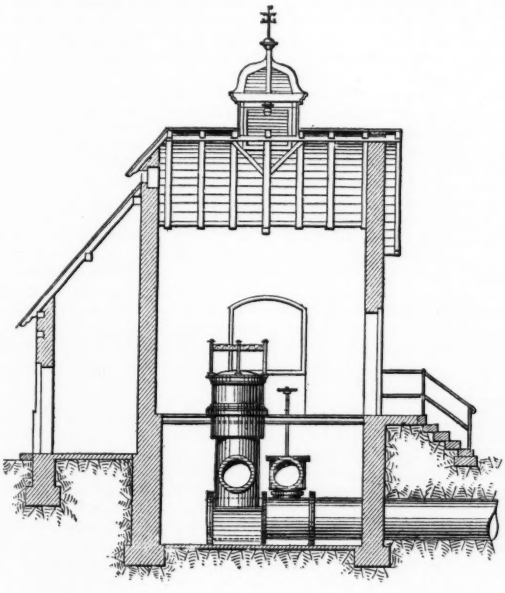


Fig. 6.—Plan and Elevation of the Steglitz Governor-House.

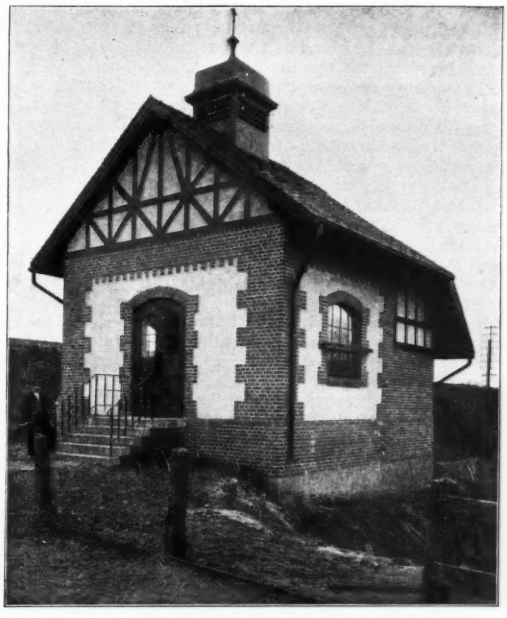


Fig. 7.—General View of the Governor-House at Steglitz.

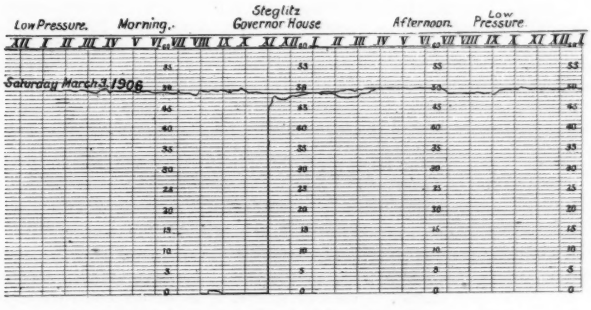


Fig. 9.—Outlet Pressure of Governor.

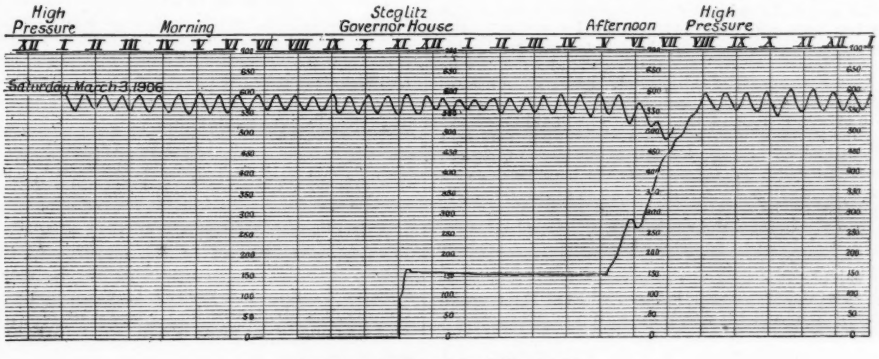


Fig. 8.—Inlet Pressure of Governor.

OBITUARY.

JAMES M'GILCHRIST.

It is with great regret that we announce the death, at Dumbarton, at a late hour on Friday last, of Mr. James M'Gilchrist, Gas Engineer and Manager to the Corporation of that town. Mr. M'Gilchrist was 58 years of age. Born in Falkirk, he early in life found his way to Glasgow, where he allied himself with the gas industry. In 1874 he was appointed Manager of the Dumbarton Corporation Gas-Works, a post he had held ever since. He was a man of much force of character, fond of company, a magnificent entertainer, and therefore popular wherever he went. He was one of the leading spirits of the West of Scotland Gas Association, and on its amalgamation with the North British Association, though he continued his loyalty to the new body unabated, he yearned for the old Association. On his initiative, the annual Informal Meeting of Gas Managers, which is held in Glasgow every spring, was initiated. He was for many years Convener of the meeting; and on its attaining its majority, in 1904, he was honoured by being appointed President. On that occasion, he delivered an address of quite a characteristic nature, and did the honours of the gathering with much acceptance. He was twice President of the North British Association—in 1881 and in 1894—the meetings in both years being in Glasgow. He occasionally contributed papers to the Association; but his support of it was more manifested by regularity of attendance, and by his never failing to take part in the proceedings. On such occasions, his remarks were always of a practical nature; for, though he was an engineer, he was not a pioneer—being, in fact, slow to adopt new schemes. For one thing, he was all for the maintenance of a high standard of illuminating power; his favourite expression being that it was light which they sold, and not gas. At the last meeting of the Association, he was again elected to the Committee; so that, had he been spared, the probability is that he would, in a year or two, have enjoyed a third term of the presidency, an honour which has only yet been held by one man—Mr. Thomas Whimster, of Perth, who is happily still with us. Mr. M'Gilchrist managed the gas undertaking at Dumbarton quietly, but successfully, and to the satisfaction of the Corporation. He was able to make processes pay which in the hands of less skilful men would have been failures. Consequently, he was able to produce gas at a low figure. But what he did was never proclaimed on the housetops. The success of his management is, however, shown in this—that the present price of gas is 2s. 9d. per 1000 cubic feet, and that during the past ten years the consumption has risen from 54 to 75 million cubic feet.

Latterly Mr. M'Gilchrist had been very largely employed in the capacity of Consulting Engineer, and as valuator of gas-works, including that of negotiator between gas companies and corporations for transfers. He was successful in accomplishing transfers without arbitration. Only the other day he so effected a transfer at Grangemouth, which was, as a matter of fact, carried through only two days before his death; and he was, in the later weeks of his life, acting in the capacity of mediator in connection with a proposed transfer at Lanark.

Mr. M'Gilchrist was very robust; but two or three years ago, as the result, it was believed, of overwork—he having acquired an interest in the business of Messrs. Kerr and Co., ironfounders, of Glasgow—he was laid aside by a serious malady. He recovered so far as to be able to resume his previous active life; but his strength never altogether returned. During the past winter he was again ailing, though not altogether laid aside. He was able to attend and take part in the Informal Meeting in Glasgow on April 4, and joined in the proceedings. Subsequent to that, he was unable to attend the formal opening of the new gas-works at Falkirk. He leaves a widow and a family of seven; the eldest, his son John, having been recently appointed Gas Manager to the Corporation of Gourock.

Appreciations of the Late Mr. M'Gilchrist.

Mr. Gilbert Little writes: The death of Mr. M'Gilchrist has not taken by surprise those who knew of his extremely weak state of health, though it will startle, as well as grieve, those of his large circle of friends who were not aware that he had been, for the greater part of the last two years, in a precarious state, following the severe illness which so affected the action of the heart that his presentiment as to the mode of his death has been partly verified. When I saw him a year ago at his summer house in Argyleshire, where I was seeking health myself, he told me he knew his sands were nearly run; and the serious illness he had during the winter hastened his end. Few men in the gas profession have been more universally liked than he, or better deserved to be in favour with every member of it. Though he could throw out a fiery jaunty taunt, like most men of Celtic blood, upon sufficient provocation, he cherished no malice; his mirth was never mistaken for malevolence; and he renounced through life the luxury of having enemies. Possessed of abilities of a high order, and an extensive knowledge of his profession, he could have aspired to fill almost any position in it; but he was content with Dumbarton, and found more enjoyment in its society, its politics, its public work, and in its ancient fame and picturesque surroundings, than could have been possible for him in any large city or town on either side of the Tweed. I can remember him when he came to be the Manager of the gas-works at Dumbarton. Much was expected of him, and his numerous admirers predicted his early call to some large sphere in England; but none knew better than himself that it is not in outward station—be it the very highest—that happiness consists. So he chose to remain at Dumbarton and deserve, as he did, the respect, almost bordering on affection, of an intelligent, if limited, community. Of his professional career I need not write, as that is well known to readers of the "Journal." His success in the designing and equipping of small works in various parts of Scotland, his popular arbitrations, in which he handled sellers and buyers with a genial, cheerful skill that made both sides sit down, on the conclusion of the business, around his festive, joyous table, to which he brought perpetual sunshine, will always be remembered. Thus his life was one of easy, continuous progress; and he enjoyed more pleasure than is the common lot. He always went energetically-leisurely about his business; and any man who has courage to do this, is never oppressed with work. Locally, he did no end of good, being always the most active and helpful in benevolent and charitable schemes. His services as a member of the School Board were invaluable; and seldom, I think, can any man have been so generally popular and esteemed in the town of his adoption. It was delightful to see the schoolchildren struggle to gain hold of his hand, as he walked about the town; his countenance beaming with delight at their playful and hearty admiration. He was ever kind and helpful to struggling lads in the town, as I have the most grateful reasons to remember. Though in feeling "a son of the land of Burns," second to few, and a Scotsman of rarely exampled patriotism, he was when "yont the Tweed" a most lovable cosmopolitan. He was gifted with clear perceptions, possessed a strong intellect, and therefore free from the weaknesses of weak men, who cannot think for themselves, and who have a prudent horror of whatever is singular and uncommon. He was, in my opinion, the most noteworthy, all-round character of his day in the gas industry of Scotland, and the death of him is the going-out of a light among all who were familiar with his presence; for he was a mirthful, happy, human spirit, and walked abroad joyously with step light and elastic—the buoyant, big-hearted James M'Gilchrist that all his friends knew and loved so weil. His loss to his "brither Scots" in the gas profession is irreparable. His visits to England invariably gave the impression that he was resolutely happy. Few visitors were more welcome; none will be more missed.

An old friend of the deceased sends us the following: A strong and striking personality; "rough but generous, and brave and kind"—big brained and big hearted; without pride or affectation. A Scotsman of the Scots, racy of the soil, but not provincial in the parochial sense. A man of many interests and wide sympathies; active in politics and public service; an enthusiastic Volunteer; a devotee of Robert Burns; and a sweet singer of his exquisite love songs. A racy after-dinner speaker; and a prince of story-tellers; in the spirit of *abandon* with which he told his stories, a source sometimes of anxiety to those who knew and understood him, and a perennial puzzle to the passing stranger. Not always wise in his subject-matter. But with him, humour was the thing; and in the telling, nothing was lost of flavour or point. His stories were his own, and to retail them was an impossibility. He had a fine scorn of anything mean or base; and could always be touched by a tale of need or injustice. Slow to adopt new methods, he could hold his own in argument with a saving sense of humour; and "even though vanquished, he could argue still." He was happy in his home life, and generous to a fault. At the social board, he was in his element; and with kindred spirits round him, he was always (wherever he sat) at the head of the table, and not seldom "the fun grew fast and furious" as his broad humanity unrolled itself in his native humour and pungent wit. Capable Engineer as he was, punctual and exact in his methods and engagements, it was his personality that told; and if the gas engineers of Scotland have held together, both in formal and informal gatherings of the brotherhood, his influence and diplomacy have been perhaps the largest unifying elements in that connection. His last public appearance was at the recent Informal Meeting in Glasgow, when he took part in the discussion, and at the dinner replied to the toast of "The Imperial Forces," with his usual *bonhomie* and fervid patriotism, emphasized by an apt quotation from his favourite author and kindred spirit, Robert Burns. Peace to his ashes, and a stone to his cairn.

The death occurred last Thursday of Alderman Thomas Baker, of Middlesbrough. Deceased had been a member of the Town Council since 1889, and a few years later succeeded Sir Hugh Bell as Chairman of the Gas Committee. He was made Mayor in 1893.

The death occurred on the 11th inst., at his residence at Brighton, in his 67th year, of Mr. Harry de la Hooke, who was for many years connected with the Clerk's Department of the Metropolitan Board of Works and their successors the London County Council.

The death occurred last Friday of Alderman William Leach Lewis, J.P., who was Mayor of Margate, and a Director of the Isle of Thanet Gas Company. Deceased was also the Principal of Margate College, and an Alderman of the Kent County Council. Death was due to the effects of an operation.

Mr. Alex. S. Robertson, Manager of the Oban Gas Company, died there on the morning of Thursday last, in his 54th year. He had been Manager at Oban for 17 years. Prior to his engagement there, he was employed in the Dalmarnock Gas-Works of the Glasgow Corporation; his occupation being that of an engineer.

A link which bound the present with the past of Hamilton, Ontario, was severed on the morning of the 30th ult. by the death, at the advanced age of 84, of Mr. Frederick W. Gates, who for a number of years was President of the Hamilton Gas Company. Mr. Gates had resided in Hamilton for sixty years, and was one of its most prominent and respected citizens. He leaves five sons and a daughter.

PERSONAL.

RETIREMENT OF MR. MATTHEW LEAF.

We learn that Mr. Matthew Leaf, the Secretary and Manager of the York United Gas Company, has relinquished this position, after upwards of fifty years' service with the Company, and has been unanimously elected a Director in succession to the late Sir Christopher Milward. Mr. Leaf's connection with the Company began as a junior clerk. At that time, Mr. Joseph Braddock was the Engineer and Manager; and on his retirement, he was succeeded by the late Mr. Charles Sellers. Before the change, however, Mr. Leaf had for some years filled the position of draughtsman, and had generally assisted Mr. Braddock in the engineering work connected with the Company, having in conjunction therewith the superintendence of the fitting department. Under Mr. Sellers, Mr. Leaf's duties were somewhat changed; but he continued to hold the position of draughtsman, and was practically the Engineer of the Company. From 1879 to 1882, new works and a railway were constructed under the supervision of the late Mr. V. Wyatt, the Company's Consulting Engineer; and they were carried out by Mr. Leaf under his guidance. Mr. Leaf joined the North of England Gas Managers' Association in October, 1901, and delivered his Inaugural Address as President just four years later. He is also a member of the Institution of Gas Engineers. In his early days, he evinced a practical interest in technical education and in the working of the classes in popular science and literature at the York Institute; and he was for many years a member of the Committee of that institution.

We are informed that Mr. Sidney E. Stevenson, Assoc.M. Inst.C.E., who about a year ago resigned the position of Gas Engineer to the Devonport Corporation, has been selected to succeed Mr. Leaf as Manager of the York Gas-Works.

Mr. John Ireland, jun., of Auchterarder, has been appointed Joint Manager with his father, Mr. John Ireland, at Tayport; and Mr. Alex. Lobban, of Comrie, son of a former Manager of the Kinross Gas Company, has obtained the position of Manager at Auchterarder.

Mr. C. H. Priestley, the Engineer to the Cardiff Water-Works, on Saturday celebrated the completion of his 25th year of service under the Corporation; and the event was celebrated by a very enjoyable function at the Heath filter-beds, near Cardiff, when the Chairman of the Water-Works Committee (Alderman David Jones) made, on behalf of the staff, a presentation to Mr. Priestley, and spoke in the highest terms of the splendid services he had rendered to the city and of his excellent social qualities and genial nature. Mr. Priestley fittingly responded, and subsequently entertained all present at a sumptuous tea. Mr. Priestley has seen great advances since he has been in Cardiff, whither he came from Halifax in 1881. Since that time, the population supplied with water by the Cardiff Corporation has increased from 85,000 to 215,000; and the revenue has risen from £20,000 in 1881 to £65,000 in 1905. To meet this increasing demand, new works costing over £900,000 have been carried out; and these are now maintained in a highly efficient condition under Mr. Priestley's able supervision. A Yorkshireman by birth, Mr. Priestley was born at Halifax, and educated there and at Blackpool, and was articled to an old-established firm of architects and engineers, Messrs. Roger Ives and Son, of Halifax. After completing his articles there, he entered the service of Mr. J. A. Parkin, M.Inst.C.E., the Halifax Water-Works Engineer, and remained with him for six years. In May, 1881, he succeeded in defeating many applicants, and secured the position of Assistant Water-Works Engineer under Mr. J. A. B. Williams, M.Inst.C.E., at that time the Cardiff Water-Works Engineer, whom he eventually succeeded in 1895. In 1886, Mr. Priestley was elected an Assoc. M.Inst.C.E., and six years later was transferred to the class of members. He was one of the founders of the British Association of Water Works Engineers in 1896, when he was elected a member of the Council. He became Vice-President of that body in 1898, and in the year 1900 was elected President, in which capacity he presided over the annual summer conference on the occasion of the Association's visit to Cardiff.

Monazite.—Reports on the results of the mineral surveys of Southern and Northern Nigeria, by Professor Wyndham Dunstan, F.R.S., Director of the Imperial Institute, have been published. In one, it is remarked that the mineral monazite—valuable as a source of the thoria used in the manufacture of incandescent gas-mantles—has been found in the gravels of certain river beds. The question as to whether it would pay to concentrate these gravels with cheap local labour and extract the monazite, is rendered practical by the facts now presented as to the nature of the gravels and their chemical composition. The search for gravels richer in monazite will be continued. The occurrence of the sands in the river beds is a matter of much interest. But it is too early yet, says the report, to state whether the sands are likely to be available as a commercial source of thoria in competition with the similar sands of Brazil and North Carolina.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 532.)

The week just closed on the Stock Exchange, though not without its good points, was not altogether satisfactory. The opening was cheered by the solution of the Turkish difficulty and the better monetary prospect; but still the markets could not be galvanized into anything like life. Consols and the gilt-edged division were under a cloud; and their influence inevitably extends a good way outside their own sphere. And so things in general remained for some days very quiet and slack. On Thursday, the atmosphere was relieved by the announcement that there would be no new Irish loan yet awhile; and Consols made some recovery. But the old heaviness fell back again next day, and things continued dull up to the close. In the Money Market, the tendency in the earlier part of the week was towards stiffer rates; but later on short loans became easier, while discount rates remained firm. Business in the Gas Market was well up to the mark in point of activity, though to a very great extent it was concentrated in the three biggest issues. Changes in quotation were few; but even then they were irregular and mixed—there being as many in the one direction as the other. Having regard to the generally prevailing dulness, and the flatness of even the highest class securities, it says something for the strength of gas stocks that they were no worse. In Gaslight and Coke issues, the ordinary was moderately active, and was very steady. Transactions marked showed a range of from 97½ to 98½. The secured issues had their full share of the business, and they, too, were unchanged. The maximum was done at from 87½ to 88½; the preference from 108 to 109½; and the debenture from 86½ to 86¾. South Metropolitan was about as busy as in the preceding week, but increasing in strength. Stock changed hands at from 126½ to 128—a rise of 1 in the quotation. Commercials continued very inactive. One bargain was done in the 4 per cent. at 115; and two in the 3½ per cent. at 110½. The Suburban and Provincial group were as inactive as usual in the London Exchange; but their stock and shares were readily taken up at good figures when offered at the Mart. Alliance and Dublin was done at 21, ditto new at $14\frac{15}{16}$, Brentford old at 265, ditto new at 202, British at $42\frac{3}{8}$ and 42¼, Bromley "A" at 124, and Tottenham "B" at 101½. In the local Exchange, Newcastle advanced half a point. In the Continental Companies, there was the greatest activity of all; dealings in Imperial being very numerous at a reduction on sellers' prices. Transactions ranged from 175 to 177½ (a fall of 1½ in the quotation); and the debenture changed hands at 97½. Union was not dealt in, but the price was put down a point. European fully-paid also was not dealt in; but the part-paid marked $18\frac{5}{8}$ (a rise of ½ in the quotation). Tuscan was done at $10\frac{5}{8}$, and Malta at $4\frac{1}{2}$ and $4\frac{9}{16}$. Among the undertakings of the remoter world, Bombay changed hands at $6\frac{5}{8}$, Oriental at 149, Cape Town at 17 and 17¼, ditto debentures at $53\frac{1}{2}$, Buenos Ayres at 12¼ and $12\frac{5}{16}$, Primitiva at from $6\frac{9}{16}$ to $6\frac{7}{8}$, ditto preference at $5\frac{7}{16}$ and $5\frac{3}{8}$, River Plate at from $12\frac{5}{8}$ to $12\frac{3}{8}$, and Monte Video at 12.

The closing prices are shown in our Stock and Share List on page 532.

Society of British Gas Industries.

The Council of the Society of British Gas Industries held a meeting towards the close of last week; and many important matters were under discussion. Among the resolutions passed was one appointing Mr. Charles Clare as the first Chairman of the Council. Considering Mr. Clare's long and earnest work in connection with the organization of the Society, this is but a fitting acknowledgment. It was also decided that the special meeting of the Society should be held in the autumn, when it is hoped the presidential address will be delivered. Several Committee meetings have to be arranged for; and these render an earlier time for the special meeting somewhat inconvenient. The Council have also been requested by certain members of the Society, and they have consented, to send a letter of protest to the Smoke Abatement Society regarding their action in refusing admittance to flueless gas-stoves at their last exhibition. The hope is expressed that at future exhibitions there will be no such refusal on the part of the Society. An official vote of thanks was passed, and other recognition made, to Mr. C. E. Brackenbury, for the admirable paper on "Contracts and Specifications" that he read at the opening meeting of the Society.

North British Association of Gas Managers.—The Committee of the Association met in Edinburgh on Monday last week, and made arrangements for the annual meeting, which is to be held in Edinburgh on Thursday, the 26th of July. The meeting-place is to be the Freemasons' Hall, in George Street, where the Association met in 1901—the last time they were in Edinburgh. The meeting is to be a short one, as a visit is to be made in the afternoon to the Granton Gas-Works. On Friday, an excursion to Kelso is to take place, for which, we understand, exceptionally good railway facilities have been secured. The meeting should prove an attractive one.

THE MIDLAND GAS ASSOCIATION AT COVENTRY.

It was a grey, cheerless morn that met the eyes of the members of the Midland Association of Gas Managers last Thursday—the day of their visit to the scene of the professional activities of their President (Mr. Fletcher W. Stevenson, M.Inst.C.E., of Coventry). But the eighty or so members who reached the Queen's Hotel in the ancient city at the early hour of 11 o'clock had no occasion to regret their resolve to fulfil their acceptance of the invitation to be present, for the sky cleared, the day was filled with interest, and there was a benignant heartiness on the part of the Corporation Gas Committee to honour the professional friends of Mr. Stevenson, and to prove by deed as well as word their pleasure in receiving them.

A Short Business Meeting.

At the hotel, a short business meeting was held. Order having been obtained, the President at once cordially welcomed the members, and expressed his hope that the programme that had been arranged would prove an enjoyable one. He also mentioned that his Chairman and some of the members of the Gas Committee would have been present to accord the members a warm welcome; but he (the President) had thought it better—this being merely a business meeting—to ask them to wait until the dinner before extending their welcome. They had already expressed to him (the President) the pleasure it had given them that the members had consented to visit the city.

Then the Hon. Secretary (Mr. Charles Meiklejohn, of Rugby) presented the minutes of the February meeting in Birmingham; and the record was declared to be a faithful one. Following this, the names of Mr. G. B. Smedley, of Swadlincote, and Mr. Charles H. Webb, of Stourbridge, were submitted for addition to the roll of members, and the vote was unanimous.

Election of Office-Bearers by Ballot.

The next matter introduced was the report of the Committee with reference to the election of officers by ballot. It was remarked by the President that the members had all received a circular, giving the recommendations of the Committee. It was felt that the general body of members should have an opportunity of passing any opinions they liked upon the proposals; and therefore they were brought up at this meeting. He would read the report to remind the members of the recommendations, and then would formally put it to the meeting.

> That nominations be made by two members (with the consent of the person nominated), and sent to the Hon. Secretary by the 30th of September in each year.
>
> That at least seven days prior to the autumn general meeting, a list of the members nominated be posted to each member, with printed envelope for reply, which must be returned to the Hon. Secretary within four days, or by the date named on the list.
>
> The ballot-papers to be opened by two Scrutineers appointed at the autumn meeting, and the result announced.

These were, the President continued, the recommendations. They were fully discussed by the Committee; and they all felt that, if they were to have election by ballot, it should be as open and full as it was possible to make it. No more open way could, in his judgment, be adopted than that of allowing any two members to nominate any other member for an official position, provided that the member nominated agreed. This provision was necessary, because without it the gentleman nominated when he came to the meeting, or he might not even be present, might not wish to serve; and this would place them in a little predicament. Before the meeting, the nominations would be circularized among the members with a ballot-paper, which would be returned to the Secretary within (say) four days, or by a date to be named. Then Scrutineers would be appointed at the meeting; and the result would be made known. Congratulations were expressed by Mr. B. W. Smith (Walsall) on the recommendations of the Committee, whose proposition he described as an admirable one. There was no discussion; and the report was unanimously adopted.

Synchronizing Clocks by Increased Gas Pressure.

Arising out of the minutes was also the question of the investigation into the synchronizing of clocks by gas pressure. This was, the President reminded the members, a matter that was brought before them by the ex-President (Mr. Thomas Berridge); and the Investigation Committee were asked to examine into it and report. They went to Leamington, and saw all that could be seen on the subject. They were very pleased and satisfied, and had drawn up this report—

> The Investigation Committee visited Leamington on the 3rd of May, 1906, and inspected the system of synchronizing clocks by an increase of about 12-10ths in the pressure of gas in the mains, as in use there, and are of opinion that the system can be efficiently worked from the controlling governor at the gas-works without inconvenience, or in any way interfering with the ordinary supply.

The report was unanimously adopted.

It was announced by the President that several members had written regretting their inability to be present—including Mr. Hunt, Mr. R. O. Paterson, Mr. Henry Hack, and Mr. J. Ferguson Bell. Mr. Paterson and Mr. Bell were engaged in London in connection with their Companies' Bills before Parliament.

Some remarks were also made by the President regarding the programme of the day. In the course of them, he mentioned that his new works were not so far advanced as some members seemed to think. The lay-out of the whole of the works had been finished, certain parts had been completed, others such as the carburetted water-gas plant and the purifiers were well under way, but the first retort-house had not yet been commenced. There was a lot of work to be done during the next eighteen months. But such as there was to show he should be pleased for the members to see. He was also sure they would have a pleasant visit to the works of the Daimler Motor Company,

Visit to the Foleshill Works.

Brakes were waiting at the door of the hotel; and the members were soon being carried on wheels through what Mr. J. H. Brown, of Nottingham, at the dinner later on facetiously described as this "city of wheels." There was a good deal heard during the day about cycles which assist locomotion, and about the cycles of prosperity and depression in trade to which the city has been subjected, and about which Mr. George Winstanley, the late Corporation Gas Engineer, with his 43 years' connection with the gas undertaking, and during a large part of that period with the work of the city, brought out during friendly conversation many interesting reminiscences. During the drive, it was seen how times have changed for Coventry. Many are the houses still standing, with residences below and the large windows above giving outward token of their original use as silk weaving-rooms. But the looms are not heard now; for the weaving industry to the city is practically dead. But in its stead has opened up the great cycle and motor-car industries, and in the midst of the city, too, other new industries have been planted. Coventry is spreading far from the old bounds; and on all hands the city looks once again secure in its prosperity.

The three miles or so between the city and Foleshill were soon traversed; and the members did not delay in commencing their investigation of the work done and proceeding there. The article describing work so far accomplished, that which is in course of execution, and the final plans for the first section occupied several pages in our issue for May 8; and to that description we must refer readers. Notwithstanding the inchoate state of things on the site at the present time (excepting in connection with the chemical works and the gasholders), the visit was indeed an instructive one; for to many of the members it must have been as interesting to see how the work is being done as it will be to see the resulting finished works, when much that appeals to the engineer is hidden. Mr. Stevenson and his son (Mr. F. H. Stevenson) were the whole time kept busy giving explanations concerning the work, and the fixed scheme for the first section. Possible developments were also much spoken of; and when the members left, they were thoroughly satisfied that for their President and his staff, for several months hence, there will not be many idle moments, but plenty of work and thought.

The Daimler Motor Company's Works—High-Power Gas Lighting.

From the Foleshill Gas-Works, the members were driven to the huge works of the Daimler Motor Company, Limited. The area covered by the shops of this famed Company can only be reckoned in acres; the men employed, by their hundreds (1500 to 1600 at the present time); and the machine tools, also by their hundreds. Great extensions of the works are projected; for the demand for motor cars exceeds the capacity to supply. The parts of a motor car are many, and the building a matter of much skill. But all the parts require for their perfection from the rough state various treatment by machines wonderfully made, and equally wonderful in their operation. All these things were noted; and so also was the system of operation, and the methodical lines along which from morn to night the work proceeds. The Daimler Company's works' organization is one that is worthy of comprehensive study.

One thing that also interested the visitors was the fact that the Daimler Company have for these large and comparatively new workshops given preference to incandescent gas lighting for their illumination throughout—the greater portion of the lighting being by 300-candle power self-intensifying lamps of the Welsbach workshop pattern. Of these there are altogether about 544. The largest of the factories—a four-storied building, in which the members spent much time—is lighted with 350 300-candle power Keith incandescent high-pressure gas-lamps; the pressure being raised by an electrically-driven compressor. The Corporation Gas Department fitted up all the lamps. It was further noted that the town's gas is used for the muffle furnaces for case-hardening, &c. Electric motors are used for the driving of the machinery. Gas, however, has got a strong footing in the industries of Coventry—no less than one-third of the gas sent out being consumed in the factories. The Gas Department intends keeping this business. What was seen at the Daimler works led to inquiries being made regarding the lighting of other great centres of industry in the city; and it was found that gas in competition with electricity has had a marked success. As examples of what has been done, it may be mentioned that the high-pressure system of gas lighting is also in use in the Triumph Cycle Works, where the compressor is driven off a line of shafting. It is also

installed in the Market Hall, where the compressor is driven by town-water pressure. An installation which will require 8000 cubic feet of gas per hour is now being put in at the Rudge-Whitworth Company's works, where there is a six-storey building, with a floor area of 3½ acres. The lighting is to be by the Keith high-pressure system, with an electrically-driven compressor. The largest consumers, however, are the Humber Company. The Gas Department, it may be added are going ahead. They have had, corresponding with the prosperity of the general trade of the city, an exceptionally good year—18 per cent. increase in the consumption; and there is every prospect of an early reduction in the price of gas, notwithstanding that they have new works in hand, and that the interest and sinking fund upon the expenditure on the works will probably swallow up some £9000 a year.

Dinner—The Gas Committee the Hosts.

After the interesting inspection of the Daimler works, the members were entertained at dinner, at the Queen's Hotel, by the Chairman and members of the Gas Committee. The Chairman of the Committee, Mr. Councillor Batchelor, presided; and on his right he had the President and Mr. Percy Martin, the General Manager of the Daimler Company. The members of the Gas Committee present were: The Vice-Chairman (Mr. Councillor Jackson) and Messrs. College, W. H. Grant, J. Grant, Errington, Loudon, Franklin, and Player.

The dinner was thoroughly enjoyed, and then a few toasts were proposed. Mr. J. H. Brown dilated on the "Town and Trade of Coventry," about both of which he knew little until he got on to the subject of motor cars, and then he was at home. He talked of the past and of the present of motor cars; and finished by associating the name of Mr. Percy Martin with the toast, making some highly complimentary remarks upon the Daimler works. In one or two of his observations, Mr. Brown referred to the Gas Department. The Committee, he said, had shown pluck and enterprise in the way they had tackled the reconstruction of their works; and conspicuous ability had been displayed in the manner in which they had been planned. The name of Stevenson was world-renowned; and, with Mr. Fletcher Stevenson in the position of Engineer to the Gas Department, the members came to Coventry expecting to see something fine on the new site, and they had indeed had ample evidence of what the new works would be when completed. In his response, Mr. Martin (who received quite a wealth of applause) spoke of the pleasure it had given him to receive the members at the Daimler works. They were always happy to see any visitors—they had nothing to hide, but everything to disclose as to the way they did their work. He also spoke of the Gas Engineer being more or less of a specialist; and, in his opinion, when a man was a specialist, and energetic, he usually succeeded. Before he left, Mr. Martin was again thanked by the members, on the proposition of the President.

The toast of the "Coventry Corporation Gas Department" was submitted by Mr. T. Berridge, who took the members back to the long past when the highly respected name of Robinson was associated with the city's gas supply. Coming to the present, he congratulated the Corporation on having on the Gas Committee such men as the Chairman (Mr. Batchelor) and the Vice-Chairman (Mr. Jackson). He acknowledged, too, how immensely the members had enjoyed their run round the new works; and complimented the Committee and the Corporation upon having had the foresight to purchase such an extent of land for the works, and upon having had such able Engineers to advise them. The Coventry Gas-Works were purchased by the Corporation in 1884; and for eighteen years they were carried on under great difficulties by Mr. George Winstanley. It was wonderful that he was able to make gas in such large quantities on the old crowded works, and to meet large increases in such a capable manner. The Coventry Corporation were most fortunate, on Mr. Winstanley's resignation, in getting Mr. Stevenson. To the gas industry his name meant a great deal; and there was not a more able member of the family. Response was made by the Chairman of the Gas Committee, who again expressed his and his colleagues' pleasure at meeting the members, and thankfulness that the members had appreciated all they had seen.

It was also responded to by Mr. Councillor Jackson, the Vice-Chairman of the Gas Committee. He said he was sure the members of the Association were as proud of their President as the Corporation Gas Committee were in having him as their Engineer and Manager. Conscientiously, he could say that Mr. Stevenson had advised the Committee with the greatest ability; and Coventry was proud of him. He had no doubt that most of the gentlemen present would have been proud to have had the erection of such works as those their President had undertaken, and of having practically £180,000 to spend upon them. However, the Corporation were convinced they could not be in better hands than they were at present. In the Association having elected Mr. Stevenson as their President, the Gas Committee felt that the glory was reflected on them. When the gas-works were completed, if the Association would come to Coventry again, no one would be more delighted than the Gas Committee, who would be glad to know that the members approved of the manner in which Mr. Stevenson had done his duty.

The last toast was that of "The Midland Association of Gas Managers," and was proposed by the Chairman, who apologized for the absence of his Worship the Mayor, who was in London with the Town Clerk on the city's business. The remarks made by Mr. Councillor Batchelor showed how greatly he appreciated the work of such technical organizations as that of the Midland Association. The undertakings in which the members were concerned eventually obtained the benefit of the knowledge gained through the Association; and therefore he regarded the Association as a great asset to the Corporation. In Coventry they had been working under adverse conditions in their old gas-works. The former and the present management had done what they could to make the best of those works; and they were not, he was convinced, moving them a day too soon. The new works would be ample for their purposes for many years to come; and he did not think that, during his lifetime at any rate, they would again be in the position they were in to-day at the old works. The Association had indeed done honour to the Gas Committee in electing Mr. Stevenson to be their President; and a more worthy man they could not have selected. In Coventry, they had known Mr. Stevenson for four years; and wherever he (the Chairman) went, he heard their Engineer spoken of in the highest terms. He was courteous and obliging, and had the happy knack of saying the right thing at the right time.

In responding, the first words that fell from Mr. Stevenson were of thanks to the Chairman and Vice-Chairman for the kind things they had said of him. From the day of his appointment, the members of the Committee had been especially good to him; and their generous reception of the Association was the latest evidence of their kindness. Referring to the new gas-works, he said the land was purchased during the time of his predecessor—Mr. George Winstanley—whom he was very glad to see present on this occasion. But as to the works for the site, the principal difference between Mr. Winstanley and himself was as to the complete removal of the old works. Mr. Winstanley felt that probably the Council would only agree to auxiliary works; whereas he (Mr. Stevenson) was fortunate enough to persuade them to build entirely new works at Foleshill, and to give up the manufacture of gas altogether within the city. He had no hesitation in saying the new works would produce gas much more cheaply than they could make it at their old works. During the past year, they had had an increase of over 18 per cent. in the consumption of gas. This being the case, it was very easy to obtain good returns; and they had obtained good returns. He knew that the members of the Gas Committee felt as he did—hopeful of being able to reduce the price of gas for the current year, notwithstanding the fact that they had (so to speak) a millstone hanging for the time being round their necks, in the shape of the new works, seeing that during construction they would get no return from them. Thanks, however, to the prosperity of the city and the motor trade, they had had these big increases in the consumption; and so he thought there was no doubt that the Gas Department would squeeze through and pay their way. They would also be able to produce and sell gas more cheaply, and so help the trade of the city. It might not be generally known that the consumption of gas in Coventry was very largely industrial—in fact, the day consumption was greater than the night. This was not the case with many towns, excepting perhaps at seaside places, where in the boarding-houses there was a large consumption for cooking. For an industrial town to have a larger day consumption than night, was an exception; but it was a great help to the undertaking; for they were, having regard to the total output, able to run with smaller works than, under other conditions, they would be able to do. Gas undertakings had now the competition of electricity and producer and suction gas; and this competition he hoped the Council would permit the Gas Committee to meet in proper manner by special reductions to those who used their gas so enormously for trade purposes. In conclusion, Mr. Stevenson further expressed the thankfulness of the Association to the Gas Committee.

In this manner ended the most enjoyable and interesting visit to Coventry.

ASSOCIATION OF MUNICIPAL CORPORATIONS.

A New President—The Question of Local Loans.

In consequence of the Guildhall being otherwise occupied, the Association of Municipal Corporations, by the courtesy of the Lord Mayor (the Rt. Hon. Walter Vaughan Morgan), held their annual meeting last Thursday at the Mansion House. In point of comfort, the room was everything that could be desired; but it must be confessed that as much cannot be said for its acoustic properties. Several of the speakers were imperfectly heard at the Press table; while the remarks of one or two were absolutely inaudible. One speaker right at the back of the meeting was asked to go on to the platform so that he might be heard there; but immediately he did so, the members at the other end of the room loudly declared that they could not catch what was being said. At the opening of the proceedings the chair was occupied by the Lord Mayor, who referred to the desire of Sir Albert Rollit to retire from the position of President of the Association, which he had held for about sixteen years. The Council had therefore decided to present him with an illuminated address, enclosed in a casket, so as to place on record the high appreciation by the Association of the eminent and valuable services rendered by him both in and out of Parliament. Sir Albert Rollit having briefly returned thanks for the

presentation, the Lord Mayor proposed the election of Sir James Woodhouse, M.P., as President; and this was unanimously agreed to. Mr. J. Harmood-Banner, of Liverpool, was appointed to the position of Vice-President, which had thus become vacant.

When Sir James Woodhouse had taken the chair, Sir Albert Rollit made a few remarks, in the course of which he referred to the determination expressed by the Prime Minister at the dinner of the Association the previous evening to do what he could to advance reasonable municipal aspirations. He (Sir Albert Rollit) hoped that the opportunity would be taken of impressing on the Ministry the need of doing something to remove many of the obstacles which at present existed to the complete fulfilment of corporate work. He referred especially to a topic which largely affected the affairs with which members of the Association were entrusted and the interest of the present ratepayers, without intrenching—and none of them would desire that—unduly on the ratepayers who were to come after, and who would receive the legacy of the great public health works that would be left them. He meant that something should be done with regard to the co-ordination and extension of the time for repayment of loans for public works. The present terms were not only repressive, but they prevented in many cases the execution of necessary public works. He was sorry to see that his friend the new President of the Local Government Board had declined to receive a deputation from the Association on this subject. He, however, knew his sympathy with municipal work; and he hoped, having regard to what the Prime Minister had said, that the request for a deputation would be persisted in, and that before very long the Department would be brought to see the urgent necessity for some reform in the respects he had alluded to. He did not, of course, urge undue extravagance; and they desired a proper audit. They did not wish to shirk fair sinking funds and proper depreciation, and least of all examination of their accounts. What they did desire was a reasonably free hand for the progress and advancement of the communities over which they ruled. Referring to the growth of the Association during his presidency, he said the number of towns included in the Association had increased from 200 to 296. He hoped he might claim that the Association had during this period been the means of vindicating the proper, the progressive, the wise, the prudent extension of municipal government. On the Association, he believed, rested the future of municipalism.

The adoption of the report and accounts was then proposed by the President, who said that the Association, during the 33 years of its existence—it was originated in 1873—had undoubtedly done much to stimulate the Legislature and assist municipalities to promote and safeguard the interests, and improve the condition, of the masses of the people. Nearly every year during the long period that had elapsed, Parliament had entrusted to municipalities fresh and increased powers; and through the wise and vigorous exercise of these powers by the municipalities, a great and peaceful revolution had been accomplished, not only in the condition of the people, but also in the appearance of the towns themselves. It was true, as they had been constantly reminded by their critics, that the local expenditure within this period had increased by no less than 100 millions a year. While the old burdens remained the same, new demands had had to be met—urgent demands for sanitary, educational, and the like purposes, and the establishment of reproductive works, such as gas, water, electric light, tramways, &c., which had no existence before the time to which he had referred. Now, it was true that this large increase of local expenditure, as well as the big growth of the national expenditure, had not provided, and did not provide, the working man with bread and clothing; but it had undoubtedly made life better, and purer, and sweeter, and had opened out careers for the poorest. In many ways the masses of the people were better than when the Association was founded. If he were asked what he deemed the most important function of municipalities, he would say that which concerned the lives and health of the people. It was right—and, indeed, essential—that ratepayers should watch and carefully scrutinize all local expenditure; but they should remember that economy did not exist in merely securing lower rates. The contrary was often the case. Low rates were not infrequently the worst form of extravagance. People saw and felt the rates they paid; they did not see, and they did not always feel, the rates they saved. A liberal sewerage or water rate might prevent an excessive rate under some other head. He then referred at some length to considerations of health; and the report was afterwards adopted.

A lengthy discussion next took place on the Unemployed Workmen's Act. Various methods of dealing with the unemployed question were suggested; the Mayor of Battersea remarking that there were two ways—the provision of national works and the reduction of the hours of labour of those who were in employment. The latter proposal, at any rate, did not appear to commend itself to the meeting. To a resolution that the Act formed no adequate solution of the problem, a rider was added that a conference should be called to consider the matter.

This question having at length been disposed of, the meeting proceeded to discuss the terms on which loans were granted for carrying out municipal works. A representative from Blackpool introduced the subject with the remark that twelve months ago a resolution was passed, to the effect that the practice of the Local Government Board, and in some cases of Parliament, of granting short periods for the repayment of loans for the construction of permanent works for the supply of water and for sanitary purposes, and also of permanent buildings for education purposes, was against the interests of the ratepayers. Representation was made to the Local Government Board; and the reply was that the Board were not prepared to make any alteration. He moved that the attention of the Board be again called to the subject. A resolution submitted from Halifax, in the following terms, was also included in the *agenda:* "That it is desirable the Public Health Act, 1875, section 234 (4) and Standing Order 173*a* of the House of Commons, should be amended so as to allow Local Authorities a term of sixty years at the least for the repayment of moneys borrowed for the purchase of land for water-works and the construction of such works, and forty years at the least for pipes, machinery, and other appliances applicable to such water-works." An amendment was proposed that the attention of Parliament and the Local Government Board be again called to the resolutions passed by the Association from time to time since 1899, with a view to the practice of Parliament and the Local Government Board being brought into harmony, and with a view also to the extension of the period for the repayment of loans for permanent works of water supply and other sanitary purposes, and public buildings, to sixty years.

The Mayor of Gateshead said he had been very much impressed with the President's speech—and particularly with one passage which applied to the matter under discussion. This was where he said that "while old burdens had continued, new ones had had to be met." He thought that lengthening the term of loans would make it impossible for the ratepayers of the future to do their duty. The town from which he came needed a new school every eighteen months; and they deeply regretted that when the Education Act was passed, the term fixed was fifty years. They wished it had been thirty years or less. The burdens that had been accumulating on the ratepayers of the present, and the demands that were being made—more extensive and more expensive than ever before—would render it impossible for loans raised now to be met in the future. He did not speak of water-works, which were practically permanent; it was the sixty years asked for school buildings to which he referred. Such loans should be for the smallest possible term. They should not aim solely at relief for the present day, but to leave a heritage improved by their efforts. Duties would rest upon those who came after. It was their own duty to endeavour to meet to the utmost the liabilities of the present. The Town Clerk of Leeds said he thought that education loans should be treated quite separately from other loans.

The next speaker was Sir Albert Rollit, who pointed out that it was not entirely a question of the length of the period of repayment; what was equally important was that there should be greater co-ordination with regard to the differing terms that existed. There was no principle whatever in their arrangement, and he should like special attention to be drawn to this point. In many cases legislation was not necessary; administrative action could secure the result. One thing in regard to which they had found the greatest difficulty was that the Department were reducing the statutory term to a sort of departmental maximum of their own. He had protested to one or two Presidents against this action. But after what the Prime Minister had said the previous evening, and remembering that they had at the Local Government Board a friend in Mr. John Burns, they should impress on the Department what it could do in the way of seeing that there was some consideration of principle in regard to the different terms of repayment, and more co-ordination effected. Take one case, the Public Health Act fixed a certain term of repayment. The maximum had seldom been granted, though he maintained that the fixing of a maximum by Parliament was meant to be suggestive of what should, as a general rule, be allowed. Why should Parliament mention a maximum term, if it was not presumably to be taken as a standard? The Public Health Act said that the Local Authority should determine the period of repayment, subject to the sanction of the Board. This was because they knew their own means and resources. The resort to the Local Government Board was only for sanction; and they knew less, as a centralized body, about local requirements. He therefore moved the addition of the following words to the amendment: "That the attention of the Department be also called to the anomalies in the different statutory terms of repayment, with a view to their better co-ordination by administrative and, if necessary, legislative action."

The amendment, with the addition of this rider, was carried; and the meeting then proceeded to consider other matters—mostly in relation to education.

Mr. David Sinclair, of Perth, is the inventor of a rotary turbine air-engine, of which he lately communicated some particulars to the representative of a London morning paper. He claims for his engine great superiority over steam, gas, or other engines; and he says that it is obtained by the combined use of the kinetic energy and the expansion energy of the air. It is generally believed that from air compressed to (say) 15 lbs. per square inch, only 15 lbs. of work can be obtained; but by the combination of the two powers—kinetic and expansion—in Mr. Sinclair's engine he says he can get 30 lbs. of work from 15 lbs. of air pressure, and *bro ratâ*, according to the power of the engine.

THE NEW GAS-WORKS OF THE KIRKBY-IN-ASHFIELD URBAN DISTRICT COUNCIL.

An Inaugural Inspection.

A LARGE party of gas engineers and others journeyed to Kirkby-in-Ashfield last Wednesday, on the invitation of the Chairman of the Urban District Council (Councillor J. Tate, J.P.), for the purpose of inspecting the new gas-works, which were described in the "JOURNAL" a week ago (p. 441). On arriving at the works, the visitors were received by Councillor Tate, the Chairman of the Gas Committee (Councillor J. G. Shacklock), and several other members of the Council; and light refreshments were then partaken of. On the subsequent tour of inspection, the many points of interest were explained by Mr. R. G. Shadbolt, of Grantham (to whose plans and specifications the works were constructed), Mr. S. Shadbolt, the Manager, Mr. J. W. Broadhead, the Managing-Director of Messrs. R. Dempster and Sons, Limited, of Elland, who were the Contractors, and Mr. E. J. King, a representative of the firm. The opinion expressed with regard to the works was that both the Engineer and the Contractors who had carried out his designs had done the best possible for the Council.

The area which the works have been erected to serve is an extensive one in the midst of the colliery district of Nottinghamshire; and it has developed rapidly during the past few years. A portion of it was formerly supplied by a near neighbour—the Sutton-in-Ashfield Urban District Council; and, as was explained last week, the Kirkby Council, in order to get the gas supply into their own hands, had to purchase the mains, &c., situated in their district, as well as to compensate Sutton for their loss of business. They had previously called in Mr. R. G. Shadbolt, who designed the gas-works which were the object of last Wednesday's function; and at present they have their hands quite full in the direction of main and service laying. With so much new ground to cover, and an absolutely modern works at command, there is plenty of scope for the energy that may confidently be reckoned upon from those who are responsible for the administration of the concern. That these efforts will in due time bring the Kirkby-in-Ashfield Gas-Works to the prosperous condition which those who are acquainted with the industry are so accustomed to look for (and, what is more, to find) in the case of such undertakings, there seems no reason whatever to doubt.

In addition to the inspection, the Chairman of the Council had invited the party to luncheon; and for this purpose they were conveyed in brakes to the Waggon and Horses Inn. Councillor Tate presided; and on his immediate right hand was Mr. R. G. Shadbolt, while on his left sat Councillor Shacklock. About sixty sat down to table. The subsequent toast-list was interspersed with song and recitation, excellently rendered by local talent. After the Loyal Toasts had been duly honoured,

Mr. A. GRAHAM proposed "The Kirkby-in-Ashfield Urban District Council;" remarking that Kirkby, though only small, was one of the most up-to-date places in that part of the country. They owned their own water-works and sewage works; and the latest development was the gas-works, which he thought they would all agree was a most excellent example of engineering. With the present membership of the Council and the existing officials, they were bound to succeed.

Councillor TATE, on behalf of the Council, acknowledged the kind remarks which Mr. Graham had made, and the cordial manner in which the toast had been received. Kirkby, he remarked, was ten years ago formed into an Urban District Council area, covering 5814 acres. During the last four or five years, the place had increased very much; and to-day it contained nearly 3000 inhabited houses. The rateable value of the district was now about £47,000. The first great scheme undertaken by the Urban District Council after coming into existence was a sewage scheme, costing some £10,000; and the result was that, with the aid of their Surveyor and his Assistant, they had sewage and outfall works second to none in the country. After that, they went in for a water scheme, and had secured for themselves a beautiful supply. He did not know exactly the cost of the water-works, but they found that the scheme provided a nice little nest-egg for the benefit of the rate; and now they were going in for an extension of the scheme. The Engineer told them that by spending £600 or £700, they would augment the supply by 4 million gallons a month. At present they were pumping 8 million gallons a month. Lastly, he came to the new gas-works, which he was also sure were second to none. In these, they had good solid work that would last. They had found in Mr. Shadbolt a gentleman who had carried out everything in a workmanlike manner; and the Contractors also had certainly done their part admirably.

Mr. H. WIMHURST next proposed "Success to the Council's Gas Undertaking." He said that, speaking with a very long experience in the gas profession, the works they had inspected that day would, in his opinion, for their size, bear comparison with any in the kingdom. They were a great credit to the Engineer. It appeared that there were some 3000 houses in the area; and if they could get all these coupled up, with a consumption of anything like 10,000 cubic feet per annum each, they would have a successful undertaking, which would help the rates, as the water-works were already doing. The district was a very comprehensive one; and this, of course, necessitated a large mileage of mains. This, together with the money they had to pay in the first instance on taking over the district from Sutton-in-Ashfield, and the cost of the new works, might handicap them for a short time; but if, with the assistance of the Engineer and the Manager, they got everyone they possibly could to take gas, they would soon have results which would be very favourable indeed.

Councillor SHACKLOCK, who responded, remarked that he had not the least doubt in his mind that eventually the gas undertaking at Kirkby would prove a source of profit to the ratepayers of the district. He was born in the place, and he had seen it grow from a mere hamlet of 2500 inhabitants into a place having a population of some 15,000. Immense strides had been made during the ten years that the Council had been in existence—the value having gone up from £18,000 to £47,000 or £48,000. Although there was no doubt they had a large amount of capital invested in the gas-works—in view of what they had to pay on taking over the supply—he calculated that in about a couple of years from now the undertaking would be self-supporting. Their Sutton friends made out there was a maintainable profit of about £800 a year—they could show that; and, therefore, he believed that when they had the whole of the district coupled up, the works would very soon pay their way. There were two or three things that conduced to the success of the undertaking. In the first place, if they were to have a successful business venture, they must provide up-to-date plant; it was no use investing money in antiquated machinery. It would be admitted by all that they had an up-to-date plant, and if they took this as a criterion, then they were on the right track so far as the plant was concerned. The next essential to success was efficient management; and he made bold to say, as the Chairman of the Gas Committee, that in their Manager, Mr. S. Shadbolt, they had a man who would do his very best for them, and who was well qualified to conduct the enterprise to a successful issue. Well, if they had good plant efficiently managed, then, so far as he could see, the only other contributory element was that of loyal support. When they got their Act passed through Parliament, they obtained the inclusion of a clause which enabled them to supply free fittings to all who would take gas. They therefore went to the householders, and said "We will put up certain lighting apparatus in your houses free of all expense, if you take gas;" and the result was that they could not keep pace with the applications for a supply. Though the district was a scattered one, needing a large area of mains, and was not so profitable to work on that account, still, with the good plant, good management, and loyal support on the part of the ratepayers, the works were bound to be a success. He guaranteed that in less than two years they would have to put down additional retorts—in fact, he was convinced that the undertaking, like those they had handled in the past, would prove eminently satisfactory. Their salvation lay in water and gas. They had got a return from water; and they were determined they would make something for the ratepayers out of gas.

Mr. J. B. FENWICK, in proposing "The Contractors," remarked that what they had seen that day reflected the highest credit on Messrs. R. Dempster and Sons. Everything was most substantial; and he had no doubt it would last their rapidly growing little town for many years to come. It was always a wise thing to entrust work to a good firm; it was cheapest in the end. He was sure they had got excellent value for their money; and he was glad they had such a bright outlook for the undertaking, which he hoped would prosper.

Mr. J. W. BROADHEAD, on behalf of Messrs. Dempster and Sons, said he was pleased to know that the work they had done was appreciated. At the same time, if a good Engineer had not had charge of the operations, however well the Contractors might have tried to do the work, he was afraid the finish might not have been so successful as it was. They had endeavoured in building the works to carry out the Engineer's instructions in every way. When first he heard that Mr. Shadbolt had charge of the work, he made up his mind to do his best to secure the job. The site, when operations were commenced on it, was very different from what it was now—in fact, it was anything but a credit to the neighbourhood. He admired Mr. S. Shadbolt, and was certain that Kirkby had secured to manage their works a young man of whom they ought to feel proud, and who had a brilliant future before him. He would also like to express his thanks to their own Clerk of the Works (Mr. W. L. Heald), who superintended the operations for his Company, as well as the Sub-Contractors for the way in which they did their part. Personally, he felt very proud of the works—which made about the fourteenth complete works his Company had built in this country and the Colonies during the last fourteen years. In conclusion, he joined in wishing the undertaking every success.

Councillor SHACKLOCK then proposed "The Engineer." He said that perhaps he had been more in touch with Mr. Shadbolt than anyone else on the Council; and he had been convinced from the first that they had been most happy in their selection of him as the Engineer for the works. Mr. Shadbolt had given every attention to the business of the Council; and he had been always ready to listen to suggestions they had made to him, and, as far as possible, to embody these in the construction of the works. He was a man calculated to rise to the topmost position in the profession of gas engineers; and he hoped that with that day's proceedings their acquaintance with him would not end, but that in years to come they would have the pleasure of consulting him with a view to carrying out extensions of the works.

Mr. R. G. SHADBOLT, acknowledging the toast, remarked that resident gas engineers, or managers, or secretaries always felt it to be somewhat of a compliment when their opinion was asked even on small matters by those in charge of undertakings other than their own; and when it came to such larger questions as the best method of continuing a gas supply and improving it, it was, of course, a greater honour still. But when one found he was in the position of being called upon to design a gas-works for a district of some considerable size in regard to area and population, on a completely new site, not bound or fettered by the mistakes of any predecessors, he considered himself most fortunate indeed. There was only one thing which could give him, under these circumstances, greater pleasure, and that was the consummation of his efforts, as expressed by their gathering that day. So much for the privileges. But, on the other hand, there were responsibilities; and when one was called upon to design works like he (the speaker) was, he felt these responsibilities very heavy. There were no data to go on,

but a lot of raw material, so to speak—a district uncultivated, and one that was growing rapidly—while on the other side there was the Act of Parliament, with its limits, and there was also the Council. Great credit was due to the Council, from the Chairman downwards, for the very open-minded manner in which they made their suggestions, and for the businesslike way in which they considered his proposals. He had received most able support from the moment when the scheme was adopted. If he might single out one member of the Council to whom the Council were indebted for the painstaking care given to the scheme, he would say that the present Chairman of the Gas Committee, Mr. Shacklock, was that man. They had been exceedingly fortunate in regard to the way in which the Contractors had put up the new gas-works. He believed that now a scheme was on foot to provide not only a suitable gas office and show-rooms, but also a Council chamber. No doubt, the Council would have for some years to come a lot of hard work before them, for which they would possibly not be adequately thanked at the time, but for which future generations would bless them. He thanked them for the hearty reception given to the toast.

Councillor G. KNOWLES, who proposed "The Officials," remarked that he was the only man whom the gas was going to ruin—he was a dealer in paraffin oil. He was, however, not afraid, for as soon as one door shut another opened. He might say that he had every confidence in the officials.

Mr. S. SHADBOLT, in reply, said that speaking generally of Council officials, he could quite endorse what appeared to be the sentiment—that they were jolly good fellows. He could safely say that the high opinions held of his co-officials were not misplaced; and he trusted that the views that had been expressed with regard to himself might prove to be equally well placed. Considering the position he had held as Clerk of the Works, he felt it was very kind of Mr. Broadhead to have spoken of him as he had that day. He had been very pleased with the complimentary comments passed on the works during the inspection that morning. If Kirkby continued to possess such energetic councillors as they had at present, and if they never had a less able and straightforward business man than Mr. Shacklock to preside over the Gas Committee, the success of the undertaking was assured.

Mr. E. B. HIBBERT, the Clerk, also responded; pointing out that it was a fair sign of the attitude the Kirkby people were adopting that many orders for gas-stoves and fittings were secured at an exhibition lately held.

The toast of "The Visitors" (proposed by Councillor W. DAVISON) was responded to by several gentlemen.

Mr. KITCHEN, J.P., the Chairman of the Sutton-in-Ashfield Urban District Council, said Sutton was delighted to see the effort that had been made by its neighbour, and the successful results so far attending that effort. Sutton people had always been proud of Kirkby.

Mr. J. H. BREARLEY thought he had picked up one or two "wrinkles" by his visit that day. Mr. Shadbolt was one of the pillars of the profession; and he could endorse what had already been said—that he would go to the very top of it, if his life and health permitted. He felt confident that his brother, Mr. S. Shadbolt, had an equally bright future before him.

Mr. JEFFREY SMITH congratulated the Council on the choice they made when selecting Mr. Shadbolt as Engineer to the scheme.

Shortly afterwards the party broke up, after having spent a most enjoyable day.

TAVISTOCK NEW GAS-WORKS.

The Inaugural Ceremony.

THERE was a numerous response last Wednesday to the invitations which had been sent to those interested in the gas industry in the Western Counties, to attend the inauguration of the new gas-works which had been built for the Tavistock Gas Company, and of which a description appeared in the "JOURNAL" last week. The Chairman of the Company (Mr. H. T. Doble) and his fellow Directors, the Chairman of Messrs. Willey and Co., Limited (Mr. F. Templer Depree), the Contractors for the plant, and the Consulting Engineer (Mr. J. W. Buckley, Assoc.M.Inst.C.E.) received the guests on their arrival. Under the guidance of Mr. Buckley, the visitors made a tour of inspection of the works. In describing the salient features, Mr. Buckley remarked that the capacity of the coal-stores was equal to three months' maximum requirements in winter. He also pointed out that, by a gangway connecting the retort-house, boiler-house, pump-room, and exhauster-house, the various operations could be kept under observation without the necessity of exposure to the weather. In the meter-house, he asked Mr. Doble to formally take over the works from the Contractors and turn on the gas to the town.

Mr. Doble expressed his pleasure at seeing so large a gathering, and said those present could easily understand how gratified the Directors and shareholders felt with the new works, so cleverly and intelligently laid out. In the first place, he had to thank Mr. Buckley for the splendid manner in which he had designed the works, and the Contractors, both for the plant and the buildings, for the efficient way in which they had carried out the designs. As to the plant, it was only necessary to mention the name of Messrs. Willey and Co. to prove that everything was complete and up to date. Material and workmanship were both first-class, and the work had been carried out to the entire satisfaction of the Directors and shareholders. Now that it was completed, the predominate feeling in their minds was one of gratitude to all who had helped to bring them to that stage. They were grateful to the people of Tavistock for having consumed the gas made at the old works, and they hoped the time was coming when there would be a still larger consumption. In turning on the gas from the new works, he hoped that it would not only be a successful flow for the Company, but that the gas would add to the comfort and happiness of the inhabitants of Tavistock.

The ceremony concluded with cheers for Mr. Doble and the Gas Company.

Subsequently the party had luncheon at the Bedford Hotel—Mr. DEPREE presiding.

Sir JOSEPH BELLAMY proposed the toast of "Success to the Tavistock Gas Company." He said it had been a great pleasure to inspect the new works. The Company was one of the oldest in the country. It had a good record, and was evidently determined to do even better in the future. A more compact and economical works could not have been designed for the town. Everything was in its place, with plenty of room for expansion when the time came for it, as they all hoped it would. Advantage seemed to have been taken of all modern improvements applicable to a gas-works of that size; and he congratulated the Directors on having up-to-date works with which to add to the prosperity of the Company. They could not, perhaps, expect to repeat the achievement of the past, when they were able to build up a reserve fund equal to three times the capital. There were different views regarding reserve funds. Municipal traders thought them useless; while gas companies were anxious to have them. Probably there was a happy medium between such extreme opinions. In these days, they would not be allowed to put aside a reserve fund equal to three times the capital; but he congratulated the Tavistock Gas Company on having been able to do it. The future was not without clouds as regarded the gas industry; and he admired the courage and assurance of the Directors in putting up new gas-works. Twenty years ago, when electricity was beginning to boom, the suggestion that new gas-works on a fresh site would be built in a town like Tavistock would have been laughed at. He did not disparage the electric light. It was a thing which gas companies had to reckon with. Fortunately, invention had come to the aid of gas, which stood in a far better position to-day than ever, notwithstanding the competition. He wished every success to the undertaking, and was sure that the Directors would do their best, not only for the shareholders, but for the consumers. The shareholders were entitled to a fair return for their money, and to compensation for the risk they ran. But the consumers must share in the prosperity of any gas undertaking; and unless they did this, prosperity would not long continue.

Mr. DOBLE, in acknowledging the toast, said that the Tavistock Gas Company must certainly claim to have been fairly successful. Notwithstanding occasional drawbacks, they had been able to pay respectable dividends to the shareholders, and had also managed to make accumulations which, to a very large extent, enabled them to build the new works. As to the future, it seemed to him that the prospects of the gas industry were never brighter than they were now. Gas was being used for purposes not dreamt of in former days; while, thanks to the incandescent burner, it had nothing to fear from the rivalry of electricity in regard to lighting. The advance in gas manufacture had been most wonderful; and the great development in the production of bye-products—sulphate of ammonia, phenol, the whole range of dyes, and various medicinal preparations, including saccharine—had exercised a strong influence on the financial success of gas undertakings. In their own case, they looked to material aid from the installation of thoroughly up-to-date plant, which would no doubt contribute to economical working and the success of the Company. It was 32 years since he was first elected a Director; and he and the Secretary (Mr. Francis), though looking back with a tinge of sadness to the fact that all who were then their colleagues had passed over to the great majority, had still very pleasant recollections of their connection with the Company and harmonious working with their colleagues. If they brought into the administration of the new Company the sound commercial and straightforward principles by which they had been actuated in the past, they need not fear for the future.

Mr. T. BRADLEY ROWE proposed "Prosperity to the Town and Trade of Tavistock."

Mr. J. J. ALEXANDER, the Chairman of the District Council, in reply, said that the Council, as the largest customer, were indebted to the Gas Company for their consideration and prompt attention to every request; and they were especially indebted to Mr. Francis for the manner in which the lighting of the town had been carried out. He hoped the new works would prove a source of benefit to the neighbourhood and a lasting credit to all concerned.

Mr. G. WILLIAMS, who also replied as a trader, said the Company had done well for the town; and he thought they might have confidence in them for the future. The shareholders would see to it that the reserve fund was not so big in the future as it had been.

Mr. J. H. S. MAY gave the toast of "The Engineer and Contractors." He congratulated the Company on having secured the services of so excellent an Engineer as Mr. Buckley; and he also congratulated Mr. Buckley on the work he had done. With regard to the Contractors, it had been his privilege to know the founder of the firm of Willey and Co., and also the late Mr. H. A. Willey. They had done in the past a large amount of most valuable, useful, and satisfactory work for the Plymouth and Stonehouse Gas Company. He believed that as gas engineers and manufacturers they were second to none; and he had no doubt that the Tavistock Gas Company were entirely satisfied with the work which Messrs. Willey and Co. had done for them.

Mr. J. W. Buckley, in reply, said that from his first connection with the Tavistock Gas Company he was determined to put into the work they required the best abilities he possessed; so that when the undertaking was completed, he might look upon it with pleasure. Eight years ago he was asked to advise the Company as to the condition of the old works, and the possibility of new ones being required. He came to the conclusion that, by an expenditure of £150, they might be able to carry on the old works for four or five years. They had done so for six years. In the meantime, it was decided to go on with the bigger scheme. He advised the Directors that the expenditure would be £10,000; and the contracts were something below £11,000. His aim in designing the new works was to provide, not only for present requirements, but also for at least 50 per cent. increase. Without the expenditure of a penny additional capital, the works were equal to an increased demand of 50 per cent.; and by putting in more retorts, and adding a lift to each of the gasholders, they would be able to meet an increase of 100 per cent. in the consumption. While providing for an increase in the consumption, he had naturally desired to keep the capital expenditure down, and it was a matter of satisfaction that, with absolutely new works, the capital expenditure of the Tavistock Gas Company would compare favourably with any similar company in the country. He had received every possible assistance from the Directors; while the Contractors had carried out the work in the most admirable way, and had given effect to every suggestion he had made. Both the Company and himself felt that Messrs. Willey and Co. had done a thoroughly good job. They were also indebted to Mr. Brearly, the Building Contractor, for the way in which he had carried out his work, and to Mr. Stapleton, the Clerk of Works, whose services the Directors had recognized by appointing him as their future Manager. One of the things which had given him satisfaction in connection with the erection of the works was that the extras on the engineering contract did not exceed 3 per cent. Reference had been made to the lighting of the town. All he could say was that it was in the hands of the District Council, and if they gave instructions the Company were prepared to provide lighting on the most modern principles.

The Chairman said it was a great satisfaction to him and his fellow Directors, as well as to the staff of Messrs. Willey and Co., to hear the references to the manner in which the contract had been carried out, and to know that they had worked harmoniously with the Gas Company and their Engineer throughout the business. They believed the Company had thoroughly good works in every respect. It was pleasant to all who were associated with Messrs. Willey and Co. to hear the references made to those who established the business. Friendship and business were supposed to be things apart; but it was not the case with those who were associated with the late Mr. H. A. Willey and his father. As for himself, he had been met on all sides with the greatest kindness, and his thanks were due to everyone who had assisted him when at a moment's notice he had to step into the position which Mr. Willey had filled so ably. While it was a pleasure to them as a Devonshire firm to be associated with the erection of a gas-works in Devon, they were carrying out work of various kinds throughout the country, and, he believed, could claim to be the only firm who manufactured every description of gas plant.

Mr. S. Nosworthy proposed "The Visitors," for whom Alderman W. Hornbrook replied.

Subsequently the party proceeded to the Town Hall, where Messrs. Willey and Co. had arranged an excellent exhibition of cooking-stoves, slot installations, and other domestic appliances. There was a large number of visitors to the exhibition during the day and on the following days of the week.

NEW ADVERTISING LITERATURE OF ELECTRICITY SUPPLIERS.

It is becoming the practice of certain electricity undertakings to scatter literature about their districts in the form of magazines, the articles and poetic effusions in which extol the virtues of electricity and decry those of gas. We have an idea that a Company Tyneside way were the pioneers in this new line; but in this we are subject to correction. Specimens of the literature, which is of a serio-comic order, have reached us from time to time, and the waste-paper basket has been a suitable destination. But the system of disseminating such literature among residents in districts in which there is an electricity supply appears to be growing; and therefore it must not be altogether ignored.

The latest thing of the kind is a little effort bearing the somewhat pompous title of "The West Ham Electrical Bulletin." A bulletin is an official version or account of public affairs or news. Therefore we may take it that this new quarterly venture that is intended to assist in mending the fortunes of the West Ham Electricity Department is edited by the Electrical Engineer, Mr. A. Hugh Seabrook. This gentleman has only occupied his position a few months; and the new advertising periodical is, it may be assumed, one of his attempts at inaugurating his official career in West Ham by making a little splash. It is rather unfortunate that the distribution of the first copy of the "Bulletin" should have been almost immediately succeeded by a Local Government Board inquiry, at which it was found that the finances of the department were in such in a disgraceful mess that the Inspector (Mr. Hooper) was obliged to adjourn the inquiry *sine die* for further information. We will give a little attention to the loose financial administration of the Department on a future occasion. Meantime, it is to be hoped that Mr. Seabrook's researches into the matters upon which Mr. Hooper is anxious to get light, will not delay the July issue of the magazine, because it is to be feared that the residents in West Ham, who are not generally of the opulent class, will, after the revelations at the inquiry, have some misgivings as to whether they can put confidence in all that is contained in the first issue.

It may be useful to examine the character of the contents of this first issue of the "Bulletin," as they are very similar in kind to publications which have been seen on previous occasions. On the "Editor's Page," a reduction of the price of electricity is announced for lighting purposes, from March 31, to 3d. per unit; and for power, from June 30, to 1d. per unit, less the usual discounts, whatever they are. It will doubtless be observed by those whose eyes the Editor's page is intended to meet, that the reductions take place in the lightest quarters of the year, so that the "cheapness" of electricity may be borne upon consumers with its full force, before the heavier bills of the winter give them a fright. The Editor labours under the common electrical illusion that a striking depreciation in lighting power goes on in connection with the incandescent gas burner and mantle, such as Mr. Leon Gaster and Mr. Lancelot Wild have lately demonstrated, and other veracious electricians have admitted—proceeds in the ordinary electric glow lamp of commerce. So long as the structure of a good incandescent mantle is not injured, and the burner is kept clean, the light does not depreciate much; and with a moderate expenditure of trouble, the consumer can keep his incandescent gas-burners up to a high illuminating power. That is more than he can do with his electric glow lamps. There is, the electrical photometrists tell us, a constant depreciation of the lights, and a constant increase of the watts of electricity required per candle power per hour. With the reduction of price, it is gathered from another page of the new periodical, a "coming" boom in electricity is "expected." Futurity is a strong point about this sentence. Of course, if the boom is a "coming" one, it may be "expected;" but it may be "expected," and yet not be coming, which we rather suspect will be the case in West Ham. At all events, West Ham is not exactly the quarter in which we should look for electrical booms. The "Bulletin" also gives an extract from an old report of the Fire Brigade Committee of the London County Council, in which nothing is said about "fires believed to have been caused by a wire fusing." It is sincerely to be hoped that there is no possibility of such an eventuality as fires (note the plural) being occasioned through a single wire fusing. One fire one wire is quite enough. But why is it there are no fires mentioned in the report as being caused by electricity? Editor answers: "Because it is based upon the writings of a responsible officer, not a smart young journalist, who believes in practising his gifts of imagination." In fairness, and as a warning, to readers in West Ham, the Editor must now quote from the last issued report by this "responsible officer." He is welcome to our comments on the report, as published on April 10.

But attention is arrested by poetry; and such poetry! When in this new electrical literature, it is necessary to get custom by such childish parodies as

> Ten little street-lamps burning in a line,
> Wind blew off a mantle then there were nine, &c.——

the electricians must be high and dry for sensible argument. We have read of the whole of the electric street lighting of towns suddenly—not lamp by lamp in the convenient manner ascribed to the ten gas-lamps—being extinguished by a trivial accident; of shopkeepers using electricity doing their business by candle light; and of frenzied householders on being deprived of electricity running hither and thither for another means of artificial illumination. Although this is the first number of the "Bulletin," its energetic Editor has got "correspondents" in its pages, and inquiries from correspondents. The "inquiries" look suspicious. One of the correspondents who bears witness to the "great advantage" of electricity over gas is Mr. G. Saunders Jacobs. This is playing the game low. Mr. Jacobs, it is noticed from a list given on another page, is a member of the Electric Lighting and Tramways Committee. The succeeding correspondent is a gentleman who enjoys life under the name of Maguire. He keeps a herbalist's and drug stores. This gentleman writes: "With more light (twenty 16-candle power lamps) than had been given by the gas, the net result was a saving of £3 in the lighting bill." The Editor really ought to be a little more scrupulous in the selection of the "correspondence" that he publishes, although it may be solicited. Mr. Maguire has twenty 16-candle lamps, which "*when new*" (as the Editor says of the gas mantle) will for a short time give 16 candles, consuming 4 watts per candle per hour. Later on, as deterioration proceeds, truthful electricians say, the consumption gets to 5 watts and over per candle per hour. However, we will take the 16 candles and multiply it by 20; and it is found that the twenty lamps are equal to an illuminating power of 320 candles. Now if we multiply these 320 candles by 4 watts per candle per hour, we arrive at 1280 watts, equalling rather more than 1¼ units of electricity, which, at the reduced price of 3d., represent 3¾d. The Editor himself on a previous page assures his readers that a unit of electricity "will supply current for sixteen 16-candle power lamps for one hour;" so that we have authority for our calculations. The price of gas in West Ham is 2s. 10d. per 1000 cubic feet. Five ordinary incandescent gas-lamps will easily give the light of twenty 16-candle power electric incandescent lights, with a total consumption of gas per hour of 20 cubic feet, which in West Ham would cost less than ¾d. How Mr. Maguire obtains more light by electricity at a less cost than gas must be due to some sort of magic—unless, of course, he has never used incandescent

burners. Mr. Seabrook must not lose track of a gentleman who can get more light and yet save £3 on his lighting bill by the adoption of electricity. He ought to be good for further testimonials, and ought to be well paid by the Electricity Department to educate their consumers.

Then the "Bulletin" quotes the approximate cost of lighting private houses with electricity at 3d. per unit. It commences, "six-roomed houses cost per annum about £2 5s., equal to 10½d. per week." This shows that without allowing anything for fitting up and renewals, £2 5s. will purchase 180 units of electricity at 3d. There are 365 days in a year; so that the six-roomed house under his estimate is allowed an average of ½ unit of electricity per day for lighting. One unit we have been told by the Editor will keep sixteen 16-candle lamps going for an hour; so that we may take it that ½ unit of electricity will maintain eight 16-candle lamps for an hour. Assuming that the occupants of a six-roomed house have the duties ordinarily falling to the lot of humanity to perform, and also indulge in the pleasures of reading and other forms of recreation and improvement, four 16-candle power lamps going at one time will be none too many in a six-roomed house—that is to say, a light equal to that given by one incandescent "C" gas-burner distributed through the six-rooms, the passages, and the stairs. The ½ unit would keep these four lights going two hours; so that the West Ham Electricity Department considers that two hours' existence in such a poverty of illumination would be quite sufficient; and we agree. But to keep to the £2 5s. per annum, the householder and his family must away to bed, and stay there until daylight. This is an example of the sort of stuff that the electricians consider good enough to serve as bait with which to capture consumers. Once the consumers are hooked, and they have incurred the expense of having their premises wired, then the electrical people think they are safe for the custom. Their accounts soon put a new face on the estimates of cost made before the premises are wired.

One more reference to this new advertising literature. There is a paragraph in the "Bulletin," headed "A word to the wise is usually sufficient." We hope it will be so if this review of some of the misstatements in this electrical quarterly meets the eye of any of the residents in the area of the West Ham Electricity Department. But what follows that heading is this: "Cut an inevitable loss at the earliest possible moment." We agree; and if the advice is accepted, the electricity consumers of West Ham will be tumbling over each other to again get on the books of the Gas Company. The paragraph, however, proceeds: "Lose no time in selling your gas-engine to someone who has no chance of getting electricity at 1d. per unit. He can do with it—you cannot." Does the Engineer of the West Ham Electricity Department know Messrs. Weinschenk? If he does, perhaps he will also be aware that his department has run a cable from High Street, Stratford, to that firm's premises (about 300 yards) has fixed a transformer chamber giving 2000 volts, and has put in three motors for three months *free of all cost* as an inducement to use electricity in place of gas. The ratepayers may consider—this being a municipal undertaking—that the Council are doing something here that is *ultra vires*, in providing motive power for a firm for three months free of all cost. However that may be, perhaps the Electrical Engineer does not know that Messrs. Weinschenk's Manager recently stated that so far as the firm have experimented, they have found that gas is 15 per cent. cheaper than electricity. The price of gas in the district, for motive power, works out to rather under 2s. 5d. per 1000 cubic feet.

We suggest to readers managing gas undertakings that such literature as this, misinforming and misleading as it is, should not be permitted free circulation, without controverting the statements. It must be remembered that the literature is intended for consumption by laymen, whose knowledge as to the amount of truth or otherwise there is in the statements, is not that of the gas manager. If there is a large number of the West Ham magazine distributed (it is printed on excellent paper), the cost of its production is not an insignificant one; and the money of the ratepayers ought not to be spent four times a year in this way, in circulating statements that we deliberately say are positively untrue, and are intended to be detrimental to the undertaking of an exceedingly large ratepayer.

A Special Flanged Water-Main.—A subway construction in Washington Street, Boston, involved the entire relaying of the water-pipe system in that street; and particulars of the work, with an illustration, are given in "Engineering Record." It was necessary to connect a 36-inch main in a neighbouring street with a main of the same size in a second street; and this involved a crossing of Washington Street, where the limitations were such that two right angles were necessary within 25 feet of each other, making a large letter S. Under the existing conditions, it would have been extremely difficult to provide for the unbalanced pressure by any ordinary system of bracing or tie-rods. It was accordingly decided to use 30-inch flanged pipe, making, in effect, a special casting about 77 feet long. The joints were made with rubber gasket; the machined faces of the flanges being coated with white-lead before the gasket was put in place, allowing the rubber to squeeze out freely. The outside of the joints was surrounded by a collar of cement-mortar to protect the bolts and the gasket. The only bracing used was a concrete strut at either end of the straight portion of the pipe.

SCOTTISH JUNIOR GAS ASSOCIATION.

Eastern District.

The last Meeting for the session of the Scottish Junior Gas Association—Eastern District—was held in the Heriot-Watt College, Edinburgh, on the afternoon of Saturday last. Mr. JAMES DICKSON, of Dunfermline, presided over an attendance which was small, owing to unusually inclement weather.

Mr. W. WILLIAMSON (Leven) read a paper entitled

SOME THOUGHTS ON THE PREPAYMENT METER SYSTEM.

The author said it was now ten years since the prepayment system was introduced at Leven; and he was safe in saying that the Directors of the Gas Company had never regretted having done so. As for the consumers, he thought they must also be held to be satisfied, as very few ever thought of returning to the ordinary meter when once they had started using the other. They, of course, had grumblers; but they were few, and did not cause much trouble. One thing he had noticed was the limited number of complaints received from prepayment consumers regarding the quality of the gas. Perhaps the gas bill not being heavy might account for this. When first introduced, they made it a practice to put prepayment meters into new houses only, or to supply them to consumers who were causing trouble in their quarterly payments. This policy had, however, been modified; and they were now always ready to change from an ordinary to a prepayment meter if by this means they might increase the consumption of gas. During the first year, they introduced about 36 prepayment meters among consumers having an average consumption of 4000 cubic feet. Since then, from 20 to 50 prepayment meters had been sent out each year, till they now had upwards of 400 of them fixed up in their district. The average consumption for the year to May, 1905, was 7000 cubic feet. The increase in the business of the Company had been due in no small measure to the help received from consumers on the prepayment system; though, at the same time, they had added a large number of ordinary consumers to their books. From the experience of his Company, he was quite satisfied that in this system gas companies should have a good and remunerative investment. When first introduced, they used to be a good deal annoyed with complaints about pennies sticking in the slots; but now that consumers were getting used to the meters, they were less troubled. Some consumers were under the impression that the newer and heavier the pennies put in, the larger the quantity of gas they obtained. Of course, the Company lost nothing by this foolish idea, but were rather gainers, owing to the few repairs required. They collected the prepayment meter accounts in the same months as their usual quarterly surveys; but in some instances they had to empty the money-boxes six times a year, owing to the large quantity of gas consumed. Makers were producing money-boxes of larger size; thus allowing them to run for a longer time without emptying. Whether or not this was a step in the right direction, was a point for discussion. In his opinion, boxes of not more than twenty shillings capacity were the proper size; for when a larger amount was standing in a house, it must be a great temptation to many people—lodgers or others—to rob the meter. As the consumer was responsible for the contents of the box, it was surely better to have smaller boxes, and empty them oftener, than increase the responsibility of the consumers. In the matter of robberies, they appeared to have been more fortunate than people in some places, for during ten years only four meters had been broken open. In one of these instances, it was a shilling meter; and the man had about £4 in it. He pleaded guilty, and was fined the ridiculous sum of £1—surely an incentive to the crime of robbing prepayment meters. He was certain that the padlock was one of the accessories of a prepayment meter which must be the best and strongest obtainable.

Scottish gas companies had not taken to the prepayment gas-meter in the way their English brethren had done. In Scotland, only 9 per cent. of their total consumers were on the prepayment system, compared with 34 per cent. in England. They must remember that prepayment consumers were, for the most part, drawn from the artisan and labouring classes, and that they in Scotland had not large centres of industry such as there were in England. In the matter of cookers, attached to either ordinary or prepayment meters, they were in the same backward position; and to this fact could be attributed the much higher consumption per consumer in England than in Scotland. They had 74 consumers who burnt between 9000 and 15,000 cubic feet of gas, six of from 15,000 to 20,000 cubic feet, and nine of from 20,000 to 33,000 cubic feet—their highest by means of the prepayment meter; the consumers in every instance being tradesmen, miners, or millworkers, who had had a cooking-stove of some description fixed in their houses. If by this means they could increase the consumption of gas from 7000 to 10,000, or even 15,000, cubic feet, gas companies must see that the appliances were in the houses of the consumers. Grillers and boiling-rings could be fixed free, and cookers let at ordinary rates of hire. In most of the instances which had come under his notice, grillers and boiling-rings were used to a much greater extent than even cookers which had been hired out. Grillers were cheap, when compared with cookers; and they should be pushed among working-class consumers. He saw no reason why they should

not have, at no distant date, as many prepayment as ordinary consumers, and, by means of grillers and cooking-stoves, the average consumption increased to 10,000 cubic feet.

Discussion.

Mr. R. PHILIP (Dunfermline) asked what extra charge Mr. Williamson made for gas supplied through prepayment meters.

Mr. WILLIAMSON said he charged 5d. per 1000 cubic feet, which he considered sufficient.

Mr. H. RULE (Falkirk) said that in 1905 they had 2200 prepayment meters in use, or 28 per cent. of the total consumers on the prepayment system. There was no doubt whatever that it was a paying concern, because the average consumption for that year, per prepayment meter, was 7200 cubic feet; but he was certain that this consumption would run up now to between 9000 and 10,000 cubic feet. When they took into account the extra cost of the prepayment meters, the upkeep, and the extra cost of collection, he thought that about 4d. was sufficient as an extra charge for gas. In his opinion, the cash-boxes should hold 30s. or 40s. In Falkirk, he supposed they had as many undesirables as there were in any other place, but they had very little trouble with people dipping into the money-boxes; and he thought the consumers should have some little responsibility in the taking care of the meters. A good, strong lock should be used; but when people wanted to break open a cash-box, they would not be stopped by a padlock—they would break through anything. Instead of altering the quantity given for a penny when the price of gas fell, it was better to keep it at the same, and to rather give the people back something. They were always greatly pleased when they got back a shilling or two.

Mr. J. R. MOYES (Edinburgh) asked if Mr. Williamson had ever had any difficulty with prepayment meters bye-passing gas. There was a good deal of trouble with these meters where there was a large alien population, because they were always complaining of their meters going wrong. The only way to deal with them was to threaten to charge them for the time of the man who was sent to look after the complaint.

Mr. WILLIAMSON replied that they had a signed agreement with consumers, which helped them to get over any trouble about bye-passing. He did not supply grillers nor boiler-rings, but would like to.

Mr. MOYES said that in Glasgow they fitted such apparatus on the top of the kitchen-grate; some houses not being suitable, for want of room, for the fitting up of them separately. They also placed gas piping round the oven in the range, which could then be used with either coal or gas. The difficulty was that they had to cut the grate to get the pipe in; and landlords demurred to this.

The PRESIDENT said he had seen the gas-pipe introduced by simply lifting up the door of the oven sufficiently to let in a half-inch pipe. Mr. Williamson had, he considered, dealt very fairly and fully with the question of prepayment, which had now become so important to all gas companies. The prepayment meter was a factor in gas consumption the value of which could hardly be over-estimated. It was a phase in the business of selling gas which did not require pushing; and the slot consumer, with griller, boiling-burner, or cooker, would, in most cases, be found to use quite 25 per cent. more gas than the consumer with an ordinary meter. If he remembered rightly, Mr. Williamson, at a previous meeting, favoured the price being the same as to ordinary consumers, once a certain consumption per year was reached. This he considered a good idea, because it appeared to him to be rather hard upon a slot consumer, using 30,000 cubic feet per annum, to be charged perhaps 6d. per 1000 cubic feet more than a consumer using 3000 feet a year. The art of cooking was now being fostered among consumers by skilled lady lecturers; and there could be no doubt that, with them going round among the consumers, giving lessons in their homes, an increased consumption would follow. They all felt indebted to Mr. Williamson; and he would ask them to award him a hearty vote of thanks for his paper.

Mr. WILLIAMSON said he had an application for a meter from a dentist. They explained to him that there would be an extra charge of 5d. per 1000 cubic feet; and when he heard that, he would not have it. He thought it might, perhaps, have been better to have given this consumer a reduction, as he might leave them some day. The use of prepayment meters must be the means of causing increased consumption. He knew of instances where consumers with ordinary meters had increased from 4000 to 5000 feet; and prepayment meters had gone up from 15,000 to 20,000 feet. Their highest consumption with a prepayment meter was 33,000 feet. This was by a widow who did ironing.

A SERIES OF QUESTIONS.

The PRESIDENT said that a paper by Mr. James D. Neillor (who had gone to be Manager of the Lochgelly Gas Company, Limited) having been withdrawn, the Council had prepared a series of questions for discussion. The first was:—

What are the advantages and disadvantages of purifying by means of oxide of iron only; and where it is possible to revivify it in the purifier by means of an air-blast (the purifier being out of action), does the revivification result equally as well as when the oxide is spread out in the open air?

Mr. D. Bisset thought that one of the great advantages of the use of oxide was that they could keep their purifying material much longer than they could with lime; there being thereby less labour. As to the disadvantages, one of them was that oxide did not take carbon bisulphide out of the gas. It took out all the sulphuretted hydrogen, but left the other bisulphide compounds. He would not purify oxide by means of an air-blast. In the open air, the revivifying was much quicker. In the blowing of air through a box, the chances were that there were channels through which the air passed, and it did not reach all the oxide. Then there was the chance of the oxide firing in the box. Mr. Rule said that oxide did not take carbonic acid out of the gas; and it became a question whether they should enrich to make up the illuminating power or use lime to take out the carbonic acid. He preferred to take it out altogether; but, of course, local circumstances to a great extent settled this question. To revivify oxide he preferred to have it out in the open air, because it might get caked in the box, and air would not properly mix with it. The President said the oxide reduced the cost of the purification very considerably, especially when revivification was carried out in the boxes by the admission of air. In Dunfermline, with three purifiers on and one off, they reduced the cost from 0·5d. to 0·09d. per 1000 cubic feet. This was not by oxide alone, for they sometimes had two boxes of lime and one of oxide, and sometimes two of oxide and one of lime. Of course, the use of oxide only meant that carbonic acid was left in the gas; and therefore extra cost was incurred by enrichment. They had had no experience of revivifying by blowing air through; but this was carried out in some places with satisfactory results. There certainly would be a saving in the emptying and filling of purifiers; and if the results were as good, there would be a distinct gain. Mr. Moyes said that with oxide they got a certain return for the material when foul; whereas with lime they had often to pay for the taking of it away.

Where benzol is used as an enricher, is it the better practice to enrich at the inlet of the holder or at the outlet?

Mr. Rule considered that benzol should not be used as an enricher before the holder, because on a winter day it would cool, and a large amount of the benzol would be found in the holder. He thought the better plan was to place it between the outlet and the station governor. The quicker they got the gas to the consumer, the better. He was not at all satisfied that they could enrich over a large area. They might enrich up to 22 candles at the gas-works; but before it got far away it might be down to 18 or 19 candles. Mr. Bisset favoured putting benzol in at the inlet of the holder. No doubt condensation would take place, but it would also occur after the outlet; and they would find that if it were inside the holder, it would be all taken up in the summer. If they put it into the holder, they had a better chance of the gas getting mixed and being more regular. It was quite true that the gas might stratify in the holder; but surely there was a better chance of its making a mixture in the holder than in the street-piping. Mr. J. Simpson agreed that if benzol were used it should be put in at the outlet; but he thought it would be better to do without benzol, and to try cannel. There would then be a great deal less grumbling about the quality of the gas, because, at a distance from the works, they would find that, with benzol it was greatly down. Mr. R. B. Waddell was of opinion that enrichment should take place at the inlet, because if it did condense in the holder in winter, this would be made up for in summer, The President was of opinion that benzol enrichment at the inlet meant an equal quality of gas in the holder. If it were introduced at the outlet, they could send out a lower quality of gas during the day, for cookers and gas-fires; but at the same time they would require to be very careful as to how they turned on the benzol, because the poor quality gas might not be all out of the pipes when they turned it on. They knew that a quarter-of-an-hour, or even five minutes, of bad gas, meant a complaint. Enrichment at the inlet would get over this, and give an equal quality, such as it was. He was inclined to think that benzol was not of much benefit, and that in a year or two they would hear no more about it.

Whether wet or dry meters are the most satisfactory on the whole for domestic use?

Mr. R. Philip would say dry meters, because they did not require the constant attention which wet meters did. They cost a little less, but they did not last quite so long; and they registered fairly correctly. Mr. Williamson said it was well known that the wet meter was the best instrument for measuring gas; and they still used it in their works. In consumers' houses they sometimes ran down, and the consumer got the benefit; but apparently very few gas companies were putting in wet meters now. The dry meter had been found most satisfactory for general purposes. Mr. Moyes was of opinion that wet meters had been prejudiced by the way in which they had been placed. Architects seemed to think that the higher up they could get a meter, the better. He would have them at a lower level, and would have all the pipes laid with a fall towards the meter, so that condensed matter would flow back to it. Mr. Rule's experience was that dry meters had been most satisfactory. When care was taken to see that they were fitted into a dry place, there was no reason why they should not last for a great many years. The wet meter was the best register generally; but in a severe winter it was liable to break down, because they could not get consumers to look after it. No doubt, also, gas passing through a wet meter took up a certain

amount of moisture, and deposited it in the consumers' pipes, greatly to their annoyance. With a dry meter, after a time the leathers contracted; and it was a common experience to find a dry meter 5 per cent. fast. Mr. G. Brown thought there was no question that gas companies favoured dry meters, otherwise they would not use them to such a large extent. Mr. Simpson had some dry meters tested; and out of 35, there was not one going slow. They averaged from 1 to 5 per cent. fast. The President considered that the large number of dry meters now being made was a great recommendation in their favour. With wet meters, there was the cost of watering, the extra attendance in a severe winter, and a larger number of complaints from consumers. The dry meter had a shorter life. The first cost was slightly less, while less attention was required; and they proved cheaper and more satisfactory to all parties in the end.

In arranging internal fittings, should the pipes be embedded in the plaster or laid on the outside of same and covered by a moulding?

Mr. J. Munro should say that pipes ought to be all in plaster in ordinary houses, but that in factories and public buildings they should be all outside on the walls. Mr. Moyes thought they should be all outside, and there would be no chance of nails being driven through them. Mr. Rule considered that the easier fittings could be got at, the better. A great deal of cost was incurred in searching for escapes of gas from concealed pipes. The President said the question was one upon which a great deal had been said, and little done. The chief reason for this was that corporations and companies had taken little say in the arrangement of internal fittings. The work was contracted for; the cheapest offerer secured the job; and the work was accomplished as speedily as possible. The most and best that could meantime be done was to insist that the piping should be carried out on up-to-date lines, and be of sufficient capacity, or else to refuse to supply.

What are the relative advantages and disadvantages of a shallow fuel bed in the producer, with the accompanying short depth of regenerators?

Mr. Simpson thought there was much advantage in a shallow setting in small works; but in large works he did not see that they would be of much advantage. The heats were much about the same, so far as he could see. Mr. Rule had now had experience with direct firing, shallow regenerator, and deep regenerator; and there was no doubt whatever that the deep-bedded fuel was the proper thing, because it allowed the maximum amount of carbonic acid to be formed, and finally burned in the combustion chamber, while a corresponding depth of regenerator permitted them to get the secondary air heated to a high temperature before entering the combustion chamber. It was a good idea to take full advantage of all the waste heat. If they had a shallow bed of fuel, they would get carbonic acid formed in the producer as well; and the result was the greatest heat in the centre of the retorts, and the extremities suffering in consequence. Of course, he quite saw that in a small works they could not get a deep regenerator; but he thought they should make every endeavour to get as deep a setting as possible. The President said that a shallow producer was in most cases rendered necessary by excavation being impossible. Though regenerators had, for the same reason, to be restricted, still, with sufficient travel for recuperation, the shallow producer was a big advance upon direct firing. Shallow producers were found mostly in smaller works, in settings of fours and sixes, where there was less volume of heating gas required than in settings of larger works. Where coke contained a great amount of small, the shallow fuel bed would be found to give the best results, on account of less obstruction being offered to the passage of air throughout. The cost of constructing a shallow producer was much reduced when, in order to provide as much space for fuel as possible, no arch was thrown over; the combustion chamber being merely an upward continuation of the producer. Then followed another advantage—in the tendency, either from bad working or other reasons, for the port-holes of the producer arch becoming fluxed or blocked through deposits, with the result that before it was possible to put things in thorough good order the setting had to be let down. At the same time, where excavations could be carried to the necessary depth, and where the number of retorts in the setting required a deep producer, with relatively deep regenerators, there could be no doubt that the necessary supply of carbonic acid gas could only be got by a deep bed of fuel, and the waste products utilized to the utmost advantage.

It was agreed that if a sufficient number of the members approved, an excursion should be held to Hopetoun House, the seat of the Marquis of Linlithgow, on a Saturday afternoon in June.

The London and Southern District Junior Gas Association will hold their fourth annual general business meeting at the Regent Street Polytechnic next Friday, for the purpose of receiving a report and balance-sheet, for the election of Council and officers for the ensuing year, and for other purposes. In his notice to the members, the Hon. Secretary (Mr. P. F. Scarth) particularly urges attendance, "as a discussion on matters concerning the Association will take place." Subsequently those items of the question-box that were left over from the last meeting will be considered.

NOXIOUS EFFLUENTS FROM SULPHATE WORKS.

In the "JOURNAL" for the 27th of March, we gave an abstract of a paper read by Dr. J. Grossmann, F.I.C., of Manchester, before the Yorkshire Section of the Society of Chemical Industry, on "The Avoidance of Noxious Effluents in the Manufacture of Sulphate of Ammonia." The text of the paper is given in the current number of the Society's "Journal," from which, with the report of the discussion, we reproduce it.

Since the passing of the Alkali Act of 1863, which has conferred incalculable benefits on the community, without in any way interfering with the development of the industry which it primarily affected, a further condition has been added to those which up to that time determined the value of a process; and however successful a method of manufacturing may be from the purely chemical or engineering point of view, it cannot now be considered satisfactory if it does not comply with the rules dictated by sanitary considerations. Progress in this direction has been naturally slow, as those in authority have liberally interpreted the provisions of the Alkali Act, and subsequent enactments of a similar character, in such a manner as not injuriously to interfere with the existing modes of manufacture.

In the case of sulphate of ammonia, other circumstances had to be considered. Up to within comparatively recent times, the bulk of ammonia was produced in gas-works which mostly belonged to municipal corporations. The ammonia liquors produced were either worked up by the corporation themselves or by local manufacturers, and the residual products turned into the sewers. In the early stages of sewage purification, these residual liquors were not considered to interfere with the subsequent treatment of the sewage, so long as the solids were previously separated; and practically all that was required from the sulphate of ammonia maker was to settle the effluents well and to only discharge clear liquor. Even then serious nuisance occasionally occurred; but, being strictly local and of rare occurrence, there was no inducement to take exceptional measures against it. It has, however, become an open question whether the ingredients present in the waste liquors from ammonia stills, even when diluted with sewage, may not interfere with the purification of the latter, particularly in the case of bacteriological treatment; and doubts are expressed in competent quarters whether ammonia works situated in towns should be allowed to discharge their effluents into the sewers.

Far more serious is the effect of these effluents when the works which produce them are situated in the country. But even then, as long as the ammonia is only incidental to the manufacture of illuminating gas, the quantity in rural districts will be, proportionate to the population, comparatively small, and capable of sufficient dilution. But where it is recovered from other manufacturing processes, such as coking, the quantity becomes disproportionate to the population; and a small village of a few hundred inhabitants may produce as much refuse gas liquor as a town of 100,000 or 200,000 inhabitants. This liquor will be discharged into the nearest stream in its natural concentrated condition, and, according to the volume of water available in the stream, cause more or less serious contamination.

It is evident that the solution of this problem may be approached from two directions—firstly, by attempting to render the waste liquors innocuous; secondly, by altering the process of manufacture in such a manner as to avoid the formation of the noxious effluent altogether. I have chosen the latter course, for reasons which would lead too far to discuss in detail—the principal one, however, being that, even if it were possible to remove the cyanogen compounds economically, there would still be left sufficient tarry compounds and compounds of the nature of phenols, to render the final effluent noxious; and I know of no method of removing these organic compounds.

In designing my process, which involves no startling new discoveries, but is in its main points a new combination of old and well-known reactions, I realized that, in order to be acceptable to manufacturers, it should as little as possible interfere with the present arrangements. My process, therefore, follows in its main line the present mode of manufacture, and branches off at a convenient point.

In the first place, the ammonia liquor is distilled by means of steam in the same stills as those used at present, but with this difference, that no lime or other alkaline substance is added.* The resulting liquor contains all the fixed salts of ammonia, besides tar oils and phenols and salts of sodium. We will, in the first instance, assume that we carbonize 200 tons of coal per day, and that the total quantity of liquor leaving the still is 10,000 gallons per day. We also assume that we work with a fairly dry coal, which, from its water in the state of moisture, and from the water formed during carbonization from its hydrogen and oxygen compounds, yields 10 gallons of water per ton of coal, or 2000

* My friend, Mr. Watson Smith, calls my attention to the sublimation of ammonium carbonate which takes place when lime or alkalis are not used, tending to produce stoppages in the still-pipes and consequent risk of explosion. (See Lunge, "Coal Tar and Ammonia," 1900, p. 777.) I was quite aware of such risks, if stills are not supplied with safety-valves; and I have anticipated all danger from this source in the apparatus I am suggesting should be used.

gallons of water per 24 hours. Taking it that we have used a quantity of steam equal to 1000 gallons of water for distillation, we find that, out of the total quantity of 10,000 gallons, 3000 gallons of water are freshly formed every 24 hours. It is evident that the remaining 7000 gallons can, after cooling, be used again in the scrubbers for absorbing a further quantity of ammonia and ammonia compounds, and that we shall only have to dispose of the 3000 gallons in such manner as to avoid a nuisance.

The figures given here are actual results obtained frequently in gas-works and sometimes in coke-works. In the latter, however, the quantity of water formed every day often exceeds the figures given here, as the coal used may contain 10 per cent. and more of moisture. It can easily be shown from thermodynamical consideration that it is against the interest of the coke manufacturer to use coal with an excessive quantity of mechanical water admixture; and if, as is frequently the case, the amount of water freshly formed and added to the products of distillation reaches 20 gallons per ton of coal, and even exceeds it, it would be to the coke manufacturer's advantage to reduce this quantity to its lowest point by using the coal as dry as is practicable.

From my own experiments, I should say that a coal containing more than 15 per cent. of water would be too sloppy for practical work. Yet I have heard of coal being used with 30 and even 40 per cent. of water. I think there must be a misunderstanding on this point; for, taking coal at 1·5 sp. gr., a coal with 40 per cent. of water would contain almost equal bulks of coal and water. I have found no coal which can be mixed with such a quantity without settling-out of the liquid; and it will be interesting to know whether there are coals of such abnormal porosity. Naturally, the greater the quantity of moisture in the coal, the greater is the quantity of water added to the condensing system every day, and the greater will be the quantity of waste liquor from the stills to be disposed of by my process in proportion to the quantity of liquor which, after cooling, may return to the scrubber.

That portion of the liquor which goes back to the scrubbers will gradually become richer in dissolved fixed ammonia and other compounds. But it will reach its limit when that portion which is withdrawn every 24 hours for further treatment becomes of such strength that it contains as much in fixed compounds as will be equal to the total quantity of these compounds which the apparatus will produce in every 24 hours.

If A equals the total quantity of effluent liquor from the still in gallons in every 24 hours; B is the number of gallons taken back to the scrubber in every 24 hours; and C is the quantity of fixed ammonia compounds formed per 24 hours (shown from testing the first operation); then if D equals the limit of the quantity of fixed ammonia compounds which will be contained in A—

$$D = \frac{AC}{A-B}$$

and if we want to ascertain how long it will be before the effluent liquor will reach that strength to within 1 per cent., we may find the number of days t from the formula—

$$t = 1 + \frac{2}{1-\log.\ \frac{10\ B.}{A}}$$

If A is 10,000 gallons, B 7000 gallons, and C 400 lbs., then the 10,000 gallons discharged from the ammonia stills will ultimately contain $400 \times 3\frac{1}{3} = 1333$ lbs. $= 1\frac{1}{3}$ per cent. of fixed salts; and from the time of the first operation it will take 14 days before this stage is reached. In like manner, if we should have to deal with an installation in which coal with 15 per cent. of water was used for coking, we should obtain for every ton of coal about 30 gallons of water in the condenser, and somewhere about 10 gallons or less of water from water-forming combinations. We should, therefore, for 200 tons of coal per day, have to dispose by my process of about 8000 gallons from the scrubbers, and to this would have to be added 1000 gallons for steam used in the distilling of ammonia; making a total of 9000 gallons.

The quantity of water used for the absorption of the ammonia in the scrubbers varies very much in different works, and is considerably larger in coke-works than in gas-works. Taking $5\frac{3}{8}$ lbs. of ammonia as an average yield per ton of coal, each ton should produce 26 gallons of 10-oz. liquor, or 52 gallons of 5-oz. liquor. On an average, the liquor will probably be of $7\frac{1}{2}$-oz. strength; so that for 200 tons of coal about 8000 gallons of water would have to pass through the scrubbers every 24 hours. As a matter of fact, this quantity will be less, as some of the ammonia is condensed before the gases reach the scrubbers. And where there is an excessive amount of water in the coal, condensation of ammonia may take place in the condensed water of moisture to such an extent that little work is left for the scrubbers, and that only an abnormally small amount of water will be used in them. In such a case, however, the only effect which would be shown in my process would be that the quantity of liquid to be cooled previous to going to the scrubbers would be less than 7000 or 8000 gallons. The quantity to be dealt with by my process would still be such as is shown above, and would mainly depend on the quantity of moisture contained in the coal. This quantity would vary from 3000 gallons in good, dry coal to about 9000 gallons in coal containing 15 per cent. of water and 5 per cent. of other water-forming constituents.

Whatever be the quantity of liquor thus obtained, it must be evaporated to a small bulk to become amenable to further treatment. It may be generally taken that the ultimate bulk after evaporation will correspond to about $1\frac{1}{4}$ gallons for every ton of coal carbonized. It will then form a strong solution of ammonium chloride and thiosulphate, besides containing some thiocyanate, sodium chloride, and possibly some ferrocyanide. Ammonium chloride can at this stage be removed to a considerable extent by cooling and crystallizing; and as some of the samples which I have examined contained up to 20 per cent. of the total ammonia going to the stills as ammonium chloride, the recovery of the ammonium chloride as such should yield considerable profit.

The remaining mother liquor will now contain chiefly thiosulphate, chloride, and thiocyanate. This liquor is placed in a still and neutralized with weak sulphuric acid so as to decompose the thiosulphate. After agitation, such a quantity or more of sulphuric acid of about 120° Twaddel is added as would form ammonium hydrogen sulphate with the ammonia contained as thiocyanate. On heating to about 100° C. or less and agitating, the thiocyanate becomes partly decomposed, and partly distils over as such. On passing the gases through limestone, a pure solution of calcium thiocyanate is obtained; hydrochloric acid not being liberated if the temperature and other conditions are followed out according to the above. After passing the calcium carbonate absorber, the gases are taken through a mixture of an iron salt with alkali, or through oxide of iron purifiers; and in either case sulphuretted hydrogen and cyanogen compounds other than thiocyanate are thus removed.

The liquor from this still, which contains ammonium sulphate, chloride, and free sulphuric acid, but no thiocyanate, may be used for diluting the sulphuric acid which is employed in the saturator. It will, however, in existing installations probably be better to use a separate saturating-box built of stone for this liquor, and take part of the ammonia from the main into it, so as to avoid any chance of the lead in the old saturator being attacked by any hydrochloric acid which may be set free. In new installations, the ordinary saturator would serve the purpose if made of material which will resist hydrochloric acid, always provided that it was found that the liquor coming from the sulphocyanogen still attacked lead.

One great advantage of the method which I propose is that it enables us to recover the ferrocyanide as well as the thiocyanate without interfering with the plant as it is in use at present. It is well known that many processes have been designed to remove the cyanides and ferrocyanides from the gaseous products of coal distillation by passing them through alkaline emulsions of ferrous oxide. All these processes require special washing apparatus; and in the case of gases from coke-ovens, it is said that the results obtained have been unsatisfactory. Two ways of recovering cyanides and ferrocyanides are open in my method. Where the quantity of these compounds is large, they may be removed as insoluble ferrocyanides or zinc ferrocyanides by adding ferrous or zinc sulphate in exact proportion (to be previously ascertained by test) to the evaporated liquor, and neutralizing carefully with sulphuric acid. After filtering, the liquor may go to the still and be treated with a further quantity of sulphuric acid in order to eliminate the sulphocyanogen. But where the quantity of ferrocyanide is not excessive, there is no need of any treatment of this kind, as the ferrocyanides will become decomposed in the still in presence of an excess of sulphuric acid, evolving hydrocyanic acid, which will be absorbed in the alkaline iron or in the oxide purifier, and thus allow of the recovery of these compounds in the shape of ferro-cyanide.

In working on this subject, a great difficulty presents itself through the fact that the composition and relative quantities of the liquors obtained in different works, even when operations are apparently carried out under the same conditions, vary very considerably. For this reason, one can only make a general forecast of the probable cost of my process. But it may safely be taken that it should in no case exceed in cost of working that of the present method. There is a saving in not using lime, which amounts to 3s. per ton of ammonium sulphate, and a saving in the quantity of steam used; and the amount of labour should be the same as before. There should be a gain in the yield of ammonium sulphate equal to about 4s. per ton, as no ammonia left in the waste liquors from the stills is eliminated from the system. There is a gain through the recovery of thiocyanate and ferrocyanide, which, taking them at only 1d. per pound, would amount to from 4s. to 20s. and more per ton of ammonium sulphate; and the extra profit on ammonium chloride may be put down at from 9s. to 13s. and more. Against this probable saving of from 20s. to 40s., we have to allow for the cost of evaporation, the cooling of the liquors, and the amortization and depreciation of the extra plant required. The cost of the first item will greatly depend upon local circumstances. Where the amount of water in coal is normal, there should be sufficient waste heat in coke-oven works to render this operation free from being a charge on the process. In gas-works, where there is no waste heat, the charge should not amount to more than 5s. per ton of sulphate of ammonia, as there is always in these works sufficient breeze to spare, which has only a low commercial value, and in some cases almost none. Even where the amount of liquors produced is excessive, it will, in many cases, be found that there will be sufficient waste coal and coke of unmarketable quality which can be used for evaporating purposes. The cooling of the liquor also depends on local circumstances; but, even under the most unfavourable conditions, the

charge for it would be small. The depreciation of plant could only take place in the evaporating apparatus, which is not expensive; and as the total installation is not costly, this item should not seriously affect the process. It must be borne in mind that the process has not been designed with a view to effecting a saving in manufacture, but to altering the old process in such a manner that it will comply with such sanitary conditions as may reasonably be imposed upon the manufacturer. If it will accomplish this without extra charge to him, it will have done all that can be reasonably expected from such a process.

In the course of the discussion on the paper, Mr. W. M'D. Mackey said he thought there was only a restricted market for cyanides and ammonium chloride; whereas the market for sulphate of ammonia was capable of almost indefinite expansion. Dr. H. Maclean Wilson, the Chief Inspector of the West Riding Rivers Board, drew attention to the importance of the subject, on account of the large development which has taken place in the coke-oven industry within the last few years. This, he said, had caused an increase in the pollution of streams and the atmosphere. By the public health law, it was forbidden to discharge liquors from washing gases into streams; and therefore he was glad to hear of the conclusion that this could be totally avoided. Mr. Purdy, speaking as a manager of a coking plant, said that the difficulty had been overcome at his works. The liquors were passed backwards and forwards through about 200 yards of open launder drain with wood hurdles for taking out the lime, &c., then mixed with the drainage water from the engines and boilers and run into a pond. They were pumped back as required into a tank, and thence to the boilers, and so used again. This had done away with the use of boiler composition, as the liquors were found to be cleansers. Mr. Wilfred Wyld asked what materials Dr. Grossmann would recommend for the evaporators. Thiocyanates, sulphides, and ammonium chloride would, he said, act on all ordinary metals such as iron, &c. Ammonium chloride crystals, as obtained from gas liquors, were usually in the crude state, and almost black, and only a limited amount could be put upon the market. Mr. T. Fairley corroborated Mr. Wyld's remarks, and said he had found ammonium nitrate to be very corrosive, and to act almost like an acid with some metals. Mr. F. Scudder expressed much surprise at Mr. Purdy's statement that the waste ammoniacal liquors could, after dilution, be used again in the boilers. This was quite opposite to the inference to be drawn from the chemical analysis of such liquors. At present, the bulk of the waste liquors produced in the country went, after settlement, directly into the sewers; and this was one of the means of disposal. In Manchester, it had not been found to interfere in any way with the bacteria beds or other methods used in the subsequent purification of the sewage. He pointed out that Dr. Grossmann had not stated the ratio of free to fixed ammonia in the liquors. Lime was not to be over-valued for driving off the fixed ammonia; the amount of sedimentary matters which had to be dealt with from ammonia stills being a serious matter. Caustic soda was therefore to be preferred; and, as a matter of fact, several works in the South of England were employing it with economical results. A certain amount of clean water must be used for removing the last traces of ammonia in the scrubbers; and this would have to go into circulation, and would bring up considerably the cost of evaporation. Cyanogen compounds must not be counted upon as a source of profit, since the supply was very much in excess of the demand. He advocated careful consideration of the amount of water in the coals used, since it was advisable to have the ammonia in the most concentrated form possible.

Replying to the remarks made upon the paper, Dr. Grossmann said that the cyanide industry in connection with gas-works was developing very much, and managers continued to put up plants for the recovery of cyanides. The main source of these compounds would, in future, be coal distillation. He thought sufficient allowance had been made in his paper for any reduction in their market value, by taking them at only 1d. per pound. From a chemist's point of view, he was unable to understand Mr. Purdy's success in using the diluted waste liquors in boilers; and he felt that, sooner or later, accidents would happen and trouble be caused. Corrosion and discoloration in evaporating ammonium chloride solutions could be prevented; and he thought it likely that a method would soon be devised for even overcoming corrosion in many other cases. The relative value of crystallized ammonium chloride to sulphate did not depend on the ratio of ammonia in the two compounds. Ammonium chloride was £5 to £10 per ton higher in price than the equivalent in ammonium sulphate. The amount of liquor which was produced every day from coal distillation, and rendered evaporation necessary, could be boiled down at little cost, as in gas-works a large amount of worthless fuel, and in coke-works of unmarketable fuel waste heat, was available. Mr. Scudder's statement that in Manchester the waste liquors from the gas-works had not been found to interfere in any way with the bacteria beds, was diametrically opposite to the information that he (Dr. Grossmann) had on this subject from a most competent quarter.

The second annual joint visit of the Manchester and District Junior Gas Association and the Yorkshire Junior Gas Association will take place next Saturday, when, by the kind invitation of Mr. Webb, the members will journey to the New Wortley Gas-Works at Leeds.

PHENOMENA OF THE WORKING FLUID IN INTERNAL-COMBUSTION ENGINES.

At the Meeting of the Royal Society on the 15th of March, a paper on "The Specific Heat of, Heat-Flow from, and Other Phenomena of, the Working Fluid in the Cylinder of the Internal-Combustion Engine," by Mr. Dugald Clerk, M.Inst.C.E., was communicated by the Hon. C. A. Parsons, C.B., F.R.S. The author has favoured us with a print of the paper, from which we take the following particulars.

The investigation was undertaken with the object of determining the specific heat of, and the heat-flow from, the highly-heated products of combustion which constitute the working fluid within the cylinder of an internal combustion engine, by a method which permitted direct observations to be made upon an actual charge taken into the engine in the ordinary operations of its cycle. The method of experiment was very simple, and the author believes it to be novel. It consists in subjecting the whole of the highly-heated products of the combustion of a gaseous charge to alternate compression and expansion within the engine cylinder while cooling proceeds, and observing by the indicator the successive falls of pressure and temperature from revolution to revolution, together with the temperature and pressure rise and fall due to alternate compression and expansion. The engine is set to run at any given speed, and at the desired moment after the charge of gas and air has been drawn in, compressed, and ignited, the exhaust-valve and charge inlet-valves are prevented from opening; so that when the piston reaches the termination of its power stroke the exhaust gases are retained within the cylinder, and the piston compresses them to the minimum volume, expands them again to the maximum volume, and so compresses and expands during the desired number of strokes.

After explaining in detail the method of examination and calculation adopted, the author described the engine and other apparatus used for the experiments. The engine was of the well-known four-cycle type, having a cylinder 14 inches in diameter and 22 inches stroke, designed for a full load of 60 brake-horse-power at 160 revolutions per minute. It was constructed by the National Gas-Engine Company, Limited, and was used by the Thermodynamic Standards Committee of the Institution of Civil Engineers, in conjunction with the author, for determination of data required for an ideal standard of comparison. It was carefully measured and calibrated by the Committee, the relevant matters being as follows:—

	Cubic Inches.
Volume swept by piston-stroke	3390·00
Total volume	4164·00
Compression space	774·00
Compression per cent. of total volume	18·59

The indicator used was of the Casertelli-Richards type. It was carefully measured, and the springs calibrated, by the author. The coal gas drawn into the cylinder was measured by a meter which had been tested by the Committee, and the air supplied was also measured by an anemometer, also calibrated by the Committee. During the experiments, observations were made of the temperatures of gas, air, and water flowing into and out of the engine water-jacket. Analyses of the coal gas used were made and the heat of its combustion was determined by the Junkers calorimeter. No leakage could be detected past either piston or valves during the experiments. To determine the specific-heat values, the engine was run without any load, and the governor was adjusted to keep the speed at about 120 revolutions per minute. The total revolutions were determined by counter; the total number of explosions were also so determined. The water-jacket was kept cold by passing water through it at a sufficient rate. The gas consumption was taken, and barometer and thermometers read. The rate of engine revolutions was also taken by means of a tachometer.

To make an observation, the indicator cock was opened and a trigger operated, after a gas charge had been taken in, to liberate the springs, pressing on the exhaust and inlet valve cam rollers. The springs displaced the rollers along their pins, placing them beyond the action of the cams. Consequently, the exhaust and inlet valves remained closed; so that though the electric spark produced the usual power-stroke explosion, the products of combustion produced were entirely retained in the cylinder and alternately compressed and expanded behind the piston—the engine being driven by the energy of rotation of the fly-wheel. The indicator pencil was lightly held against the card during a number of revolutions, and traced a series of gradually falling lines. The tachometer was observed and readings made at the moment of explosion, and at the moment of last contact with the card. In this way the actual time of each double operation was accurately known. During the first five revolutions after explosion, the speed dropped from about 120 revolutions to 116 revolutions, so that the variation was only from 3 to 4 per cent. This variation, however, was allowed for in preparing the cooling curves. Indicator diagrams were also taken with a light spring, to determine the pressure of the charge within the cylinder on the completion of the charging stroke. It was found that the cylinder was entirely filled at this low speed, so that the pressure within was the same as that of the

external atmosphere. Thirty indicator cards were taken at this speed for examination, and the proportions of gas to air were varied within narrow limits to discover whether a slight change in composition changed the specific-heat values materially. The values of specific-heat given are the mean values obtained from 21 cards, in which the mixture was of nearly the same proportions.

The mean composition by volume of the working fluid calculated from the analysis of the coal gas used at the works was—

	Vols.
Steam (assumed gaseous)	11·9
Carbon dioxide	5·2
Oxygen	7·9
Nitrogen	75·0
	100·0

The mixture, however, was varied slightly between the extreme compositions—

	Vols.	Vols.
Steam (assumed gaseous)	11·2 and	12·7
Carbonic anhydride	4·8 ,,	5·5
Oxygen	8·7 ,,	7·0
Nitrogen	75·3 ,,	74·8
	100·0	100·0

These two extreme compositions correspond respectively to explosive mixtures containing before combustion 1 volume of gas to 9·8 volumes of air, and 1 volume of gas to 8·5 volumes of air.

Table I. shows the apparent instantaneous specific heats at different temperatures taken from the curve obtained; and Table II., the mean apparent specific heats for temperature ranges from 0° C. up to 1500° C.

TABLE I.—*Apparent Specific Heats (Instantaneous) in Foot-Pounds per Cubic Foot of Working Fluid at 0° C. and 760 mm.*

Temperature. °C.	Specific Heat at Constant Volume. Foot-Pounds.	Temperature. °C.	Specific Heat at Constant Volume. Foot-Pounds.
0	19·6	800	26·20
100	20·9	900	26·60
200	22·0	1000	26·80
300	23·0	1100	27·00
400	23·9	1200	27·20
500	24·8	1300	27·30
600	25·2	1400	27·35
700	25·7	1500	27·45

TABLE II.—*Mean Apparent Specific Heats in Foot-Pounds per Cubic Foot of Working Fluid at 0° C. and 760 mm.*

Temperature. °C.	Specific Heat at Constant Volume. Foot-Pounds.	Temperature. °C.	Specific Heat at Constant Volume. Foot-Pounds.
0—100	20·3	0—900	23·9
0—200	20·9	0—1000	24·1
0—300	21·4	0—1100	24·4
0—400	21·9	0—1200	24·6
0—500	22·4	0—1300	24·8
0—600	22·8	0—1400	25·0
0—700	23·2	0—1500	25·2
0—800	23·6		

From these numbers it is evident that the apparent specific heat of the working fluid, consisting of products of combustion in the cylinder of the internal combustion-engine, increases considerably with temperature; so that at 1000° C. the value is 28 per cent. greater than it is at 100° C., while at 1500° C. the increase amounts to 31 per cent. The mean apparent specific heat between 0° and 1000° C. is 24·1 foot-pounds per cubic foot, or 15 per cent. greater than at 100° C.; while at 1500° C. the increase amounts to over 20 per cent.

The curve taken showed that while apparent specific heat increased more rapidly at first, it tended to a limit at the upper temperatures, so that from 1200° C. to 1500° C. the increase was less than half that from 900° C. to 1200° C. The appearance of the curve suggested a limit for the apparent specific-heat value after no great further increase in temperature. "Is this a real increase of specific heat?" the author inquired. If combustion be completed, then there appears to be no other explanation. But he asked his audience to consider the points of difference which arise between a real change of specific heat with changing temperature and an apparent change caused by continued combustion. If the continued combustion be due to dissociation, then it would be impossible to differentiate by any experiments of this kind; but if it be combustion continuing at a given time rate, then discrimination is possible. With a real specific-heat change, it is obvious that values calculated from any expansion line will show a fall along that line depending on fall of temperature only. No increase of specific heat could occur on the falling temperature expansion line. This is also true for change due to dissociation. If, however, combustion be continuing, then the apparent specific heat may vary from point to point of the line depending on the relations between the instantaneous values of the rates of heat addition to the working fluid and work performed by it, on the piston. If the rate of heat addition be less than that of work performed, then the temperature will fall; but if the work rate diminishes more rapidly than the combustion rate, then, at a certain point of the expansion, the rates may become equal and then the expansion line may become isothermal, and it is even conceivable that the temperature might rise. In such a case specific-heat values calculated from point to point of the supposed expansion line would show an increase with falling temperature, and at the isothermal point would become infinitely great. If combustion continues at a rate which becomes relatively greater than the work rate, it is evident then that specific-heat values will increase all along the expansion line as pressure and temperature falls. It has been already stated that this is found to be the case, but numerous calculations have been made from many diagrams which always show this interesting effect.

To illustrate this point, calculations were made from a card, with the results shown in the following tables:—

First three-tenths of stroke	26·3 foot-pounds per cubic foot
First half of stroke	27·3 ,, ,, ,,
Second half of stroke	34·3 ,, ,, ,,
Whole stroke	28·4 ,, ,, ,,

Other cards showed greater differences between the first three-tenths and the later parts of the stroke, some as much as 50 per cent. increase. Other indications were given by varying the rate of revolution of the engine:—

	160 Revolutions.	120 Revolutions.
Whole stroke	34·4 foot-pounds	31·0 foot-pounds.
First half stroke	29·5 ,,	28·3 ,,
First three-tenths stroke	27·2 ,,	26·6 ,,

This experiment clearly indicates an increase of apparent specific heat with increasing speed as well as increased apparent value with falling pressure.

Still another indication is given by varying the temperature of the water-jacket of the engine, keeping the speed of the engine constant. The experiments were made with the engine running at 120 revolutions per minute with the water-jacket cold (13° C.) and hot (66° C.). Three expansion lines were calculated for the first three-tenths stroke. The results obtained were as follows:—

Water-Jacket at 13° C.	Water-Jacket at 66° C.
26·6 foot-pounds.	23·9 foot-pounds.
25·2 ,,	22·6 ,,
23·9 ,,	21·9 ,,

The experiments, therefore, appear to prove that some combustion is proceeding. The nature of the apparent specific heat also changes, as the rate of apparent change is greater at the lower temperatures, taking the same portion of the stroke.

In the next section of the paper, the author deals at length with the subject of heat-flow values, and then passes on to the calculation of the total heat given to the combustible mixture from the indicator diagram only. This showed that from 104 to 106 B.T.U. were given to the gases in the cylinder for each power explosion. If this method be correct, the total heat so found should correspond with that known to be present from the measurement of the gas supply. The coal gas present in the mixture per explosion was 0·183 cubic foot; and its lower heat value was 574 B.T.U. per cubic foot. Then $0{\cdot}183 \times 574 = 105$ B.T.U. The diagram thus accounted for the 105 B.T.U. known to be present in the form of coal gas. Calculations from other indicator diagrams confirmed the correspondence of the diagram-calculated heat values with those determined from the heat values of the gas known to be present. These apparent specific-heat and heat-flow values now make it possible for the first time to study the thermodynamic problems of the internal-combustion motor from the indicator diagram only; and this the author believes will materially hasten the development of a complete theory of these motors, by making it practicable to determine the principal properties of flame in the engine cylinder itself. Many obscure phenomena are capable of investigation by the method.

The author next proceeds to review the earlier investigations into the subject under consideration, and then gives the following conclusions:—

1.—The apparent specific heat of the working fluid of the internal combustion engine (consisting mainly of a mixture of nitrogen, carbon dioxide, steam, and oxygen), when calculated from the first three-tenths of the engine stroke, undoubtedly increases between the observed temperatures 300° C. and 1500° C., but tends to a limit at the upper temperature.

2.—The apparent change in specific heat is not entirely due to a real change of specific heat, but requires in addition continuing combustion to account for all the facts.

3.—The rate of heat-flow from the working fluid to its enclosing walls for equal temporary differences varies throughout the stroke. Increased heat-flow accompanies increased mean density.

4.—The mean temperature of the inner surface of the enclosing walls varies with the portion of the stroke examined from 190° C. for a whole stroke to 400° C. for the first three-tenths stroke under working conditions at full load. These mean temperatures, however, are not the highest mean temperatures reached by the walls.

5.—The heat distribution during the operations of the working fluid can be determined with approximate accuracy from the apparent specific-heat values and heat-flow values obtained from the diagram only.

In bringing his valuable paper to a close, Mr. Clerk points out that the method of investigating specific heat, fall of temperature, and loss of heat developed is applicable to determinations of the specific heat of gases heated without combustion. The experiments on the compression of practically a mass of flame show that even at high temperatures the heat-flow to a cylinder is

lower, on the whole, than the rate of addition of heat to the mass of gas by performing work upon it. For example, in many of the experiments one complete compression, occupying 0·25 second, raises the temperature of the contents of the cylinder from 1000° C. to 1300° C., showing that the rate of heat-flow from the gas, even at a mean temperature of more than 1000° C., is considerably less than the rate at which heat can be added to the gas by work performed. From this indication, it is evident that a simple gas, such as nitrogen, oxygen, or a compound such as carbonic acid, could be heated by compression alone, in a suitable apparatus, to at least 1500° C. It only requires a sufficiently powerful mechanical apparatus to stand the high pressure of about 1½ tons per square inch to get any desired temperatures. Such determinations will be entirely free from doubt due to possible combustion. The method described requires some modification, owing to the fact that where all the heat is added by compression, at one part of the stroke the gas would be absorbing heat, and at another part giving it out.

The author concludes by expressing his thanks to his assistant, Mr. W. Grylls Adams, M.A., for his very effective aid in the laborious work of measuring the diagrams and making the numerical calculations. He also had much pleasure in discussing with him the somewhat numerous points of difficulty which arose in the course of the investigations.

In a short appendix to the paper, the author deals with the subjects of mean temperature, the division of heat-loss between the expansion and compression lines, and the errors of reading, &c.

NOTES ON INTERIOR ILLUMINATION.

At a recent Meeting of the Illuminating Engineering Society of New York, two papers dealing with the subject of interior illumination were read and discussed.

The first paper was by Mr. R. M. Searle, of Mount Vernon (N.Y.), who dealt specifically with the proper use of gas-lamps, and emphasized the necessity for teaching the general public to employ the most efficient and effective burners for each class of service. He pointed out that one of the greatest sources of loss is the absorption of the light-rays by the globes. A portion of this loss may be attributed to the frosting on the globes; but in most installations the major part is caused by the deposit of dirt, which is usually much greater with frosted than with clear globes. Poor and uneconomical service can often be traced to improper supervision of the lamps; and, in this connection, too much stress cannot be laid on the importance of using good tips. In selecting the locations for the lamps, due regard should be had to the possible service which each lamp can render. A slight change in the position of a lamp may cause the light from it to serve more than one purpose—for example, a hall-lamp may at the same time throw rays into the parlour or living-room, or a kitchen-lamp may serve to light the table, range, and sink. The author advocated encouraging the use of portable reading-lamps. He remarked that persons in a household often prefer different rooms to read in; and if side lights were available they could easily be equipped with suitable attachments. Reading-lamps were the best long-burning units of light in domestic use. In conclusion, Mr. Searle said the consumer should always have the benefit of the knowledge and assistance of the gas company's representative.

The other paper was by Mr. Douglas Burnett, of Baltimore (Md.). He laid stress on the importance of obtaining definite information or rules by which lamps, and particularly electric lamps, should be arranged for obtaining the proper illuminating effect. The author presented a long list of questions relating to specific lighting problems, in order to invite discussion concerning them. He expressed the opinion that arc lamps are hardly to be considered acceptable for illuminating furniture stores or for general office lighting, and that incandescent lights are not best suited to department store lighting. He thought it was desirable that some definite agreement should be come to with reference to the unit of illumination—*i.e.*, as to whether the units should be candles or watts per square foot of floor area or per cubic foot of room volume, or whether the foot-candle unit should be used. He stated that some very good results had been obtained by planning the illumination on the basis of from 1 to 2 watts per square foot.

In the discussion on the papers, one member pointed out that the object in illuminating a store window was both to attract attention and display the goods. Therefore all lamps should be hid, so that the light did not directly reach the eyes of the observer. If border lamps were used, they should be well shaded. Dr. A. H. Elliott stated that with both gas and electric lighting excessive fatigue of the eye was produced when the illumination was irregular or the light was of improper colour. The physiological features of illumination presented numerous problems which should receive careful and thorough study. He endorsed the statements made by Mr. Searle with reference to gas lighting. Mr. W. S. Kellogg, speaking from the point of view of the architect, remarked that more trouble arose from the excessive brilliancy of the illuminants than from the lack of illumination. It was of primary importance to consider the distribution of the lamps. Mr. T. J. Lytle, dealing with the disadvantage arising from using concentrated illumination, pointed out that the objection which had often been urged against the Welsbach mantle on account of the whiteness of the light had been overcome in a recently perfected mantle which afforded a yellow-white light. He said the most effective illumination was that obtained from tinted-globed lamps used in a room with white ceiling and cream-coloured side walls. The inverted gas-burner had been found to be quite efficient, and it was specially advantageous for decorative effects. The real problem confronting the illuminating engineer related to the proper selection of glassware for the lamps, and the right colour for the rooms. Mr. J. Campbell expressed the opinion that the major portion of the existing bad illumination was due to the misleading statements made by the different sellers of appliances, and to the prevalent use of rule-of-thumb methods in deciding upon the number and location of the illuminants. Mr. W. D'A. Ryan remarked that it was extremely difficult to get people to agree to use less light uniformly distributed. They insisted on obtaining an excess of brilliancy. Mr. E. L. Elliott, closing the discussion, said he thought the fittings manufacturer should be instructed to make them conform to scientifically designed lamps and shades, as it was absurd to assume that the natural laws of light would be changed to conform to his desires.

REGISTER OF PATENTS.

Manufacture of Gas for Illuminating, Heating, or Power Purposes.—Elworthy, H. S., of St. Albans, and Williamson, E. H., of Fenchurch Street, E.C. No. 7713; April 11, 1905.

By this invention, the patentees claim to secure a gas equal in heating and lighting value to coal gas, and at the same time presenting "the great advantage of being non-toxic and free from the objection of naphthalene and similar deposits in the mains." The carbon monoxide is removed, and in its place "the valuable and non-toxic constituent methane" is substituted.

In a previous patent (No. 12,461 of 1902), they described various processes of preparing gas for illuminating or other purposes by subjecting water gas to the action of nickel at suitable temperatures and in the presence of sufficient hydrogen for the conversion of the carbon monoxide or carbon dioxide (or both) of the water gas into methane and water on contact with the nickel—one or other of the oxides of carbon being in some cases removed prior to the reaction. There were also described, in patent No. 14,333 of 1904, various methods of making gas, by subjecting gas obtained from the destructive distillation of coal or other similar source, mixed or not with water gas, Dowson gas, producer gas, or the like, to the action of metallic nickel at suitable temperatures to convert the oxides of carbon and hydrogen present into methane and water. In these latter methods, heavy hydrocarbons are removed prior to the reaction; while hydrogen is sometimes added to bring the percentage of it up to the required theoretical proportion for the reaction. In some cases, one of the oxides of carbon is removed prior to the reaction, and in others a combined coal and water gas is used for the reaction.

[For convenience, they refer to the various reaction mixtures employed in these two prior patents as the water-gas reaction mixture and the coal-gas reaction mixture respectively. The term "coal gas" includes any gas obtained by the destructive distillation of coal, bitumen, or like material.]

In most of the above methods, the gas or mixture subjected to the action of the nickel contains hydrogen in about the theoretical proportion corresponding with the formula of conversion; and where less than this proportion of hydrogen is present, it is generally added to (approximately) make up the theoretical proportion. The gases in all cases undergo considerable shrinkage as the result of the reaction.

They have now found (as the result of further study and practical trials, that in all the methods described the reaction can be greatly facilitated, and a much more complete conversion of the reaction gases into methane effected in the nickel-chamber by conducting the reaction in the presence of a considerable excess of hydrogen, or, it may be, in the presence of methane, or a mixture of both. By employing an excess of hydrogen, they are enabled to compensate for the shrinkage which the converted gases undergo in the reaction, while at the same time facilitating the conversion as explained.

The conversion may be effected at the same temperatures as in the methods above referred to—viz., about 250° C. for the monoxide and about 350° C. for the dioxide—care being taken to regulate the temperature of the reaction, which is exothermic, within the required limits.

They add to the water-gas reaction mixture or coal-gas reaction mixture, containing hydrogen in substantially theoretical proportion for the conversion, a suitable quantity of methane for the purpose described, and are thus enabled to obtain a gas consisting substantially of methane. The added methane may be conveniently obtained from a preceding reaction or stage of the working. For general purposes, they add the methane to any of the water-gas reaction mixtures or coal-gas reaction mixtures in equal proportions; but these may be varied within wide limits according to the nature of the gas or mixture to be treated. The mixture is then passed over the nickel, as already explained, at suitable temperatures, to convert the oxides of carbon and hydrogen into methane and water.

An important feature of the present invention is to employ an excess of hydrogen for the purpose of facilitating and improving the conversion and obtaining a cheap combined mixture of the gases. This excess of hydrogen is not attacked, but "causes the reaction to proceed with greater regularity, facility, and safety." The oxides of carbon present in the water-gas reaction mixture or coal-gas reaction mixture, and an equivalent proportion of the hydrogen, are very effectually transformed into methane, and the excess hydrogen mixes with the methane produced, so that a "valuable gas, consisting practically entirely of

methane and hydrogen, can be obtained, having a high calorific power and substantially free from the poisonous properties of carbon monoxide and the disadvantageous presence of carbon dioxide.

To illustrate this part of the invention, they take as an example an ordinary water gas, consisting in substance of carbon monoxide and hydrogen. As above explained, the amount of hydrogen theoretically required for the conversion of carbon monoxide into methane and water is indicated by the formula

$$CO + 3H_2 = CH_4 + H_2O.$$

Now, by adding hydrogen to this water gas until there are about three volumes of hydrogen present in the mixture in excess of that theoretically required, and then passing the mixture over the finely-divided nickel at the proper temperature, a gas is obtained possessing a calorific power practically equal to that of ordinary coal gas and equally suitable, or even more suitable, than ordinary coal gas, for incandescent lighting purposes. Such gas, with an equal or even less consumption, will, it is said, allow of obtaining an equal lighting power to that of ordinary coal gas with an ordinary Welsbach burner and mantle. The excess hydrogen may be mixed with the water-gas reaction mixture or coal-gas reaction mixture prior to its passage over the nickel, or the production of the water gas or coal gas may be conducted so as to secure the presence of the surplus hydrogen in the gas. The requisite quantity of surplus hydrogen may be added to the mixture after the conversion, as hereafter mentioned.

By varying the amount of the excess hydrogen, it is possible to increase or diminish the richness of the gas made to suit different requirements. The calorific power of the gas can be increased by reducing the amount of the excess hydrogen, and the gas can then be advantageously mixed with coal gas or other combusitble gas of too low a calorific power; and in this way there is obtained a gas of any desired illuminating and calorific power. With a similar object, to illuminating gas of low calorific power may be added the gas obtained by effecting the conversion in the presence of methane, as herebefore described. Or the gas produced in this latter way, or by carrying out the reaction in the presence of excess hydrogen, may be added to coal gas or lighting gas generally, or to any other combustible gas, to meet different requirements.

The new gas obtained by conducting the conversion in the presence of excess hydrogen may be carburetted if desired—being, moreover, "very susceptible of practical and economical enrichment in this way." This can be effected, for example, in a similar manner to that used for water gas; the consumption of carburetting agent employed being, however, much less than required for water gas for a given illuminating power. Or, with great advantage the gas may be carburetted, when required, by passing it through retorts of ordinary type, wherein the distillation of coal is being conducted for the production of gas. In this way, the gas passed through the retorts will, to a large extent, prevent the decomposition of the higher hydrocarbons produced from the coal, and is enriched by these hydrocarbons. By this means, gas of high calorific and illuminating value may be produced without the use of any other carburetting agent; but the gas may be further carburetted if desired.

The gas obtained by carrying out the conversion in the presence of methane (with or without excess hydrogen) may also be carburetted as just explained, or in any other suitable way.

Another feature of the invention consists in mixing the excess hydrogen with the water-gas reaction mixture or coal-gas reaction mixture after the conversion—*i.e.*, at any stage after leaving the nickel conversion-chambers. Such added hydrogen may, if preferred, be previously carburetted by passing through coal-gas retorts or otherwise. In this way, there may be mixed with the reaction mixture sufficient hydrogen to make up for the shrinkage which the gases undergo in conversion in the nickel-chamber. Thus a gas of much greater value bulk for bulk is said to be obtained than it has "ever hitherto been possible to make at an equal cost;" the hydrogen being capable of production at a very low cost by the action of steam upon iron, and the high value of the converted gases allowing of their being mixed therewith to a very substantial extent. If desired, a portion of the excess hydrogen may be added to the reaction mixture before the conversion, to assist the reaction; and the remainder of the excess hydrogen may be added to the gas after the conversion, to increase the bulk.

The gas obtained in either of the ways just described may be carburetted if desired by passing it through coal-gas retorts, as above explained. It may likewise be added in any desired proportion to coal gas to obtain any desired illuminating or calorific power.

Production of Coke, Ammonia, Illuminating Gas, Tar, Benzol, and other Products by the Distillation of Carbonaceous Materials.—Aarts, J. G., of Dongen, Holland. No. 8187; April 17, 1905.

This invention relates to a process for the production of coke, ammonia, illuminating gas, tar, benzol, and other products by the distillation of coal and other carbonaceous materials which "permits of the distilled products being separated from the raw materials in a simple manner, in a suitable retort, by the use of a minimum of externally applied heat."

Many processes are known (as the patentee points out) for the production of coke and other distillation products from coal and similar substances by treatment in retorts; but they have "the disadvantage that the products are further decomposed during their passage through the retorts." These and other objections are, however, said to be obviated by the use of the process now to be described, the main feature of which consists in continuously charging raw material into the top end of a retort, which is surrounded with spirally arranged heating channels and heated in such a manner as to graduate the temperature from the hottest zone towards both ends of the retort. In this manner, the coal continuously introduced at one end traverses temperature zones increasing in heat until it reaches the hottest temperature zone, where complete distillation and gasification take place, after which the material gradually passes through cooler and cooler zones. The opposite end of the retort is provided with a water seal, so that the hot coke is delivered into the water and cooled by producing superheated steam—the coke being removed in a cool condition. The chief advantages said to result from the process are the following.

(1) *Maximum Temperature.*—According to the maximum temperature employed in carrying out the process, there will be produced either more vaporous or liquid products. In the manufacture of lighting gas, it is advantageous to employ high temperatures; while in the manufacture of coke, ammonia, tar, and other liquid products, low temperatures are preferred. For example, when the maximum temperature is kept between the limits of from 600° to 800° C., the decomposition in the lower part of the apparatus will be partly on the lines of the formula—

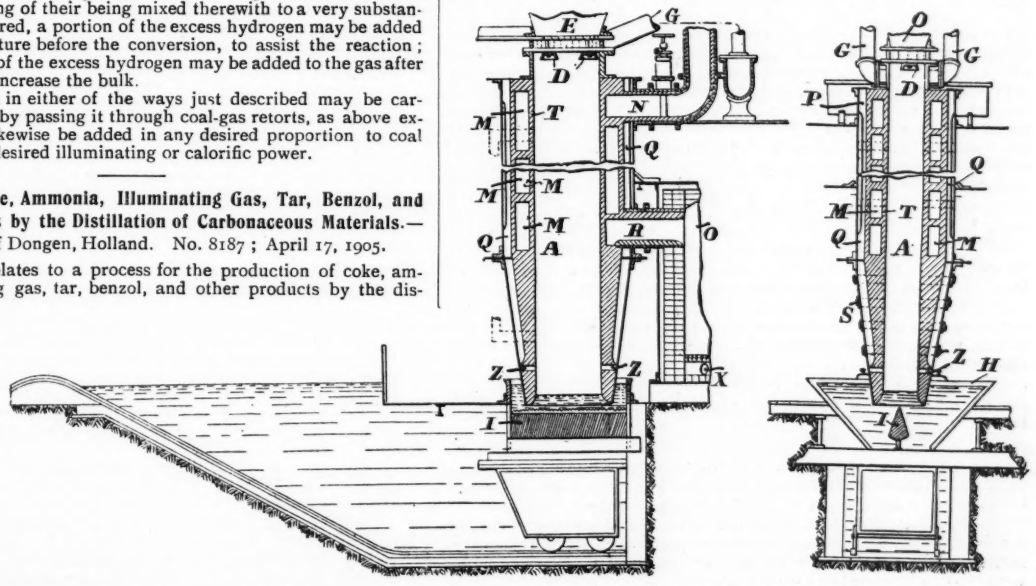
$$2\,H_2O + C = 2\,H_2, + CO_2, \text{ and partly—}$$
$$4\,H_2O + 3C = 4\,H_2 + CO_3 + 2\,CO$$

It is obvious that a larger quantity of coke is produced, that the external heating can be carried out with a comparatively small quantity of combustibles, that the time for getting the final products is shortened, while, further, the decomposition of the ammonia is prevented.

(2) *Heat-Recuperating Gasification by Counter Current and Carrying-off Draught.*—For the reason that the temperature in the retort decreases towards both ends from the maximum temperature zone, the distillation products from the latter will be caused to aid the distillation in the cooler zones by giving off heat and carrying away the local distillation products. At the same time, the glowing coke transfers its heat in a useful manner to the water for the formation of steam and water gas. The external application of the heat produces an effective counter-current for the gasification, because of the continuous introduction of the charge at one end of the retort and the introduction of the heating gases at about the middle of the retort. Therefore, perfect regeneration and recuperation of the accumulated heat in the products of distillation and generation are effected.

(3) *Fractional Gasification and Non-Decomposition.*—As the products of distillation from the zone of generation travel at once through cooler zones, it will be impossible for them to receive further decomposition. The heat from the gasification products ascending from the lower zones is utilized in the distillation of the higher and colder strata; and thus the complete recuperation of heat, together with a fractional gasification, is effected (principle of fractional distillation and non-disassociation).

(4) *Calorific Equivalent or Heat Equalization.*—All the heat for the generation of the water gas being exclusively obtained from incandescent coke at the lower end of the retort, and if the part of the apparatus where this generation takes place be appropriately constructed, generation of water gas will proceed in uniform proportions of temperature, velocity, pressure, composition, and quantity. In consequence of this uniform water-gas production in the coke-chamber, there will prevail a calorific equivalent or heat equilibrium at the part where the heat contained in the coke is equal to that of the collective heat used in the formation of the steam and its decomposition in the reduction of the carbonic acid and the accumulation of heat in the hot water gas. By reason of this equilibration of the heat, it will be impossible to have either an excess or too little, whether of steam or water gas. Further, these uniform conditions ensure a regular distillation with unvarying conditions of temperature, pressure, time, quantity, and composition.



By raising or lowering the maximum temperature, it will be possible to alter the time at which the equilibration of the heat occurs.

(5) *Coke Production.*—The distillation in this apparatus, as also the influence of the superheated steam of varying temperature, brings about the expelling of impurities—namely, sulphur, phosphorus, and so forth—from the coke; and the latter is therefore "pure and free from noxious elements." The density and firmness are favourably affected by the great pressure of the charge and cooling by the water bath—the latter imparting to it "the desirable silver grey appearance."

(6) *Ammonia Formation.*—In consequence of a superabundance and uninterrupted presence of hydrogen, a prolific formation of ammonia takes place in the upper part of the apparatus, owing to the *status nascendi* of the distilled nitrogen. The re-decomposition of the ammonia is impossible, for the reason that the ascending gases are passing continuously through cooler zones. Another portion of non-separated nitrogen compounds of the coke is absorbed within the generation zone by the superheated steam under favourable conditions; and "the formation of ammonia in *status nascendi* proceeds most readily with the decomposition of the steam and the nitrogen compounds."

(7) *Carburetting.*—The illuminating power of the gas can with this process be readily varied, because the tar-oils, petrol-residuums and the like carburetting mediums can be introduced at any temperature zone suitable for them; while at the same time any appreciable heat from the incandescent coke-column is utilized for the fixing of the permanent illuminating gases—these latter, upon their formation, passing at once into cooler zones, thereby escaping subsequent decomposition. The deposition of carbon from the oils takes place in the column of coke itself.

The illustration on the previous page shows the process as carried out in a vertical retort; the sections being shown at right angles to one another. The upper end of the retort is fitted with a charging appliance E, which introduces the previously broken coal in a constant quantity upon deflectors D, from which it is uniformly distributed into the retort. The heating of the walls of the retort is effected by external spiral-shaped channels M, which receive the hot gases from any suitable furnace—for example, a regenerator furnace O. The arrangement is such as to supply the greatest heat to about the middle of the retort and allow the gases, in gradually cooling, to pass out into the outlet conduit N fitted with a damper. An advantageous temperature reduction during the ascent of the heating gases from the lowest heating point to the highest is said to be about from 1700° to 300°, or for lower operating temperature from about 1000° to 200°.

The spiral heating channels may be surrounded by a jacketing space Q to warm the air used for supporting combustion in the furnace. This air is supplied by a pipe P, and passes in a downward direction to the regenerator furnace through (say) a pipe X situated beneath the grate of the furnace. An annular plate divides the jacket space into two parts—the lower part being merely a heat-insulation space—that is to say, it has no current of air passed through it, but is a dead-air space. The heated air or hot products of combustion pass through the pipe R into the spiral channel M.

The charge slowly passes into zones of higher temperature, and thus the readily volatile components will be separated first; while the most resisting components are distilled in the hottest zone, where the complete gasification and coking of the charge takes place. The slowly descending masses of coke pass through zones of decreasing temperatures, and the ascending products of distillation—namely, gas, tar, ammonia, and so forth—also pass through zones of decreasing temperatures. In this manner, subsequent decomposition is avoided; while, moreover, the recuperation of the heat from the products of distillation, and the discharge of the products at the lowest possible temperature, are effected. The discharge takes place through the pipe G provided at the upper end of the retort.

The subsequent treatment of the products of gasification does not form part of the invention, so further reference to them is unnecessary.

The incandescent coke passes from the middle zone of the retort downward. This part of the furnace receives no external heat; but sight-holes S are provided to permit of the inspection of the coke. The lower strata of the incandescent coke-column is in contact with the water-bath, and so produces steam, which ascends the interior of the furnace through hotter and hotter layers of coke, and at about 500° is decomposed into hydrogen and oxygen, with the result that first carbonic acid is formed, which rises with the hydrogen into zones of about 1100°, and by its contact with the incandescent coke becomes reduced to carbon monoxide and forms water gas. By reason of the regular formation of hydrogen in the absence of an air blast—that is, nitrogen and carbonic acid—the water gas produced is of the purest quality. The uniform quality and purity of the water gas improves to the highest degree the quality of the distillation products that are formed in the upper part of the furnace.

The gasified products from the lower part of the furnace may be partly utilized for heating the upper portion, as described later on. The admixture of carbonic acid with the illuminating gas has to be carried out within narrow limits with this process, because the continuous action of the ammonia upon any carbonic acid present is said to take place under materially better conditions than with the ordinary method of distillation.

The special advantages of the retort provided for carrying out this process are claimed to be as follows: (1) In consequence of the great pressure column above the lower strata of coke or coal, the coke produced is of dense and solid structure throughout. (2) The water bath imparts the desirable silver-grey colour to the coke. (3) The superheated steam dissolves and drives off the impurities—namely, sulphur, phosphorous, and the like—and therefore the coke produced is particularly suitable for furnaces and for foundry purposes.

For the purpose of facilitating the discharge of the coke from the water seal or bath H, there is a wedge-shaped saddle or ridge-bar I, to serve as a support for the entire column of coke in the retort and prevent it being imparted to the conveyer immediately below.

To produce a large proportion of tar oil instead of illuminating gas, the patentee states that it will be advantageous to draw off a portion of the superheated steam (before decomposition)—that is, at a temperature of about 500°—from the lower zone of the furnace, and, by means of a suitable conduit, re-introduce such steam of 500° into the upper zone of the furnace, and in this manner produce distillation through the application of highly superheated and undecomposed steam. By reason of the smaller volume of water gas produced, there will be an increased quantity of coke and tar oil.

Moreover, the quantitative proportions of illuminating gas, tar oil, and coke can be varied by the reduction of the maximum temperature for the process. For example, with a maximum temperature of 600° to 800° the water-gas generation proceeds according to the formula—

$$2H_2O + C = 2H_2 + CO_2, \text{ or}$$
$$2H_2 + CO_2 + C = 2H_2 + 2CO$$

The patentee concludes his specification by saying that the enriching of illuminating gas with this process by the introduction of tar oils and similar materials is particularly easy, "for the reason that the introduction of such tar oils or the like into the retort can be made at quite definite temperature zones, so that the fixation of a permanent illuminating gas through the useful heat of the coke column is effected by the deposition of the carbon in the latter."

Anti-Vibrator for Incandescent Gas-Burners.—Williams, J. T., of Liverpool. No. 11,250; May 30, 1905.

According to this invention, the burner has, within an enlarged chamber or head at the top, a long spiral or volute spring of fine wire (preferably flat); the spring being made in conical form, with its greater and lower diameter resting on the bottom or other supporting part of the chamber or head, while the central and higher part of the spring is adapted to receive and form a rest to the rod which supports the mantle. Thus the central part of the burner acts as a guide, while the full weight of the rod and mantle comes upon, and is carried by, the spring. By having a long length of coiled-up spring made in the way described, and of a suitable light nature, "a very sensible, and at the same time soft and resilient, support is afforded."

Shock-Proof Apparatus for Preventing Incandescent Gas-Mantles from Breaking.—Sutton, C. J., and Rudd, J., of Bolton. No. 13,717; July 4, 1905.

This device, for the prevention of incandescent gas-mantles being damaged, through excessive vibration or shocks, consists of a frame and spring, as described in patent No. 292 of 1903; but no flexible tubing is required. The lamp is suspended from a spring attached to the ceiling; and its bottom portion is bell shaped, in order to give room in the portion that creates the bunsen burner to receive a circular spring similar in design to the hair spring of a watch or clock. This spring is attached from the centre to the gas-nipple; and the outer coils serve as a rest or guide to keep the suspended lamp in position without unduly impairing the sensitiveness of the suspension spring—thus, as the patentees point out, "securing a more sensitive anti-vibrator and dispensing with flexible tubing, as the friction caused by a tube connection to a large degree impairs the free action of the suspension springs and prevents the absorption of shock."

APPLICATIONS FOR LETTERS PATENT.

10,619.—Helps, G., "Gas-fittings." May 7.
10,620.—Helps, G., "Bunsen burners." May 7.
10,621.—Helps, G., "Globe-holders and burners." May 7.
10,664.—Hays, P. J., "Acetylene generators." May 7.
10,751.—Tolson, J. E., "Gas-producer." May 8.
10,783.—Biheller, S., "Inverted lamps." May 8.
10,784.—Biheller, S., "Incandescent burners." May 8.
10,794.—May, J. W., "Mantle-supports." May 8.
10,810.—Alexander, C. J., "Gas-regulators." May 9.
10,814.—Graham, J. G., "Condensing and purifying gas." May 9.
10,826.—Winter, J. H., "Support for pipes." May 9.
10,827.—Fowler, C. H, and Medley, E. A., "Gas-producers." May 9.
10,835.—Lynde, F. C., "Petrol gas." May 9.
10,887.—Tully, C. B., "Carburetted water gas." May 9.
10,890.—Anderson, D., "Lamps." May 9.
10,945.—Fitzpatrick, H. D., "Bunsen burner." A communication from W. Weickart. May 10.
10,952.—Pecile, A., "Acetylene generators." May 10.
10,965.—Brooks, B. W., "Incandescent burners." May 10.
10,968.—Lamplough, F., and the Albany Manufacturing Company, Limited, "Rotary pump, exhauster, and blower." May 10.
10,982.—Helps, W. H., "Rotary pump or blower." May 10.
11,001.—Graetz, M., "Incandescent lamps and burners." May 10.
11,004.—Hersey, S., "Washer-scrubbers." May 10.
11,013.—Hall, L. G., "Gas cooking-stoves." May 11.
11,052.—Harrison, H. T., "Photometers." May 11.
11,077.—Fillunger, A., "Obtaining ammonia from gas liquor." May 11.
11,080.—Galey, H. M., "Mantles." May 11.
11,082.—Block, E. H., "Incandescent burners." May 11.
11,083-4.—Block, E. H., "Mantle-holders." May 11.
11,085.—Block, E. H., "Supports for mantles." A communication from J. I. Robin. May 11.
11,089.—Ingram, H., "Acetylene generators." May 11.
11,099.—Browne, A. F., "Manufacture of gas from coal and carbonaceous materials, also relating to water gas." May 11.
11,125.—Ewing, W., "Hydraulic main seal." May 12.
11,133.—Burschell, E., "Removing sulphide of hydrogen from gas." May 12.
11,193.—Riedinger, E., "Igniting devices." May 12.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

The Question Papers for the Gas Manufacture Examinations.

SIR,—There are two sides to every dispute; and as only one has been given on the above subject in your columns, I should like to suggest the other.

It is easily understood that there is, as Mr. Cranfield says, "dissatisfaction and indignation" on the part of those whom Dr. Colman's very easy papers in the past have lulled into a feeling of pleasant security. It is interesting to note the sudden increase in "passes" in both grades that took place when a change in Examiners was effected. In Mr. Colson's time, it was unusual for more than three students to pass in the first class of the honours grade, and perhaps half-a-dozen in the ordinary grade. When Dr. Colman became Examiner, they suddenly began to pass both grades in shoals. This is, no doubt, partially due to improved and increased means of study; but it is almost entirely due to the fact that Dr. Colman set very much easier, and therefore less valuable, papers.

An examination is not instituted with a view to giving students an opportunity of showing how well (and how parrot-like) they have stuffed their heads with mere book knowledge, but are intended to show the Examiner what breadth of grasp the student has of the subject, by the *manner* in which he answers the questions, not so much by the correctness of those answers. Consequently, a paper which contains somewhat indefinite questions, capable of elastic answers, is of vastly more value to the Examiner as a criterion of the student's knowledge. The syllabus is admittedly only a guide, and is itself very elastic; and I maintain that Mr. Browne has kept well within his rights as an Examiner.

I fail to see any foundation for Mr. Cranfield's objection to questions Nos. 3, 5, 7, and 9 in the ordinary grade. They are questions that any first-year pupil should be able to answer superficially; and, so far from discouraging a student, they should prove of much greater value to him than those questions that admit of only one issue in their answers—either "quite right" or "quite wrong." "Student," whose letter appeared in your last issue, was unfortunate in not having access to a teacher who knew the value, to a gas engineer, of the knowledge required to answer question No. 5. With regard to No. 9, does "Student" hope to qualify for these examinations by recourse to text-books only? If so, the sooner he gives up mere academic study and tackles every-day practice the better.

It is most obvious that the questions this year were set by a man who makes practice a science, and science a guide rather than a chain. I should like to congratulate Mr. Browne on the excellence of his papers as a test of knowledge. By such questions alone can he be certain that the students have a broad grounding in the knowledge of their profession, and not a practically useless book-knowledge only. The value of an examination becomes of no account if anyone with a good memory can, by cramming, pass it easily. Memory is all very well, but judgment is infinitely better; and the answers to Mr. Browne's questions will show it up, if the students possess it. I am sure Mr. Browne will not expect any student to answer his questions faultlessly, and in every minute detail; and no one could determine better than he the knowledge shown in the answering of them. I hope he will maintain the high standard to which he has raised these examinations, and not make them useless by setting questions which any schoolboy could answer by merely reading the text-books.

Mr. Walter Grafton's suggestion to tear up all the papers is too wild to call for more than a passing notice. Such a proceeding would be fatal to the future value of the examinations, and would be a pitiful capitulation to "duffers." If he imparts to his pupils the knowledge necessary for them to become efficient engineers, they will have no difficulty in showing Mr. Browne, by their answers to questions such as he has set, whether or not they are likely to become such.

May 19, 1906. SILVER MEDALLIST (in Mr. Colson's time).

The Cheapest Gasholder.

SIR,—Although unwilling to prolong discussion, I am bound to reply to Mr. Hovey's letter in your last issue, as it might otherwise give an erroneous impression as to the cost of gasholders in England.

Referring to the East Greenwich gasholder of 12 million cubic feet capacity, I have Sir George Livesey's authority for stating that the figure given by the late Mr. Frank Livesey was for gasholder and tank inclusive, and worked out at just £5 per 1000 cubic feet capacity; but that the cost of the gasholder alone was well under £4 per 1000 cubic feet. This, I think, is sufficient justification for my statement that the cost of the holder alone was "considerably under" £5 per 1000 feet.

As regards my own design at Bournemouth, to which Mr. Hovey alluded, the actual cost of the gasholder alone was £4 17s. 9d. per 1000 cubic feet capacity.

After one gets below £5 per 1000 (particularly for the smaller sizes), every penny saved becomes more difficult to attain.

71, *King William Street, E.C., May* 19, 1906. F. S. CRIPPS.

The Kent County and Laindon Prospectuses.

Mr. WORTHINGTON CHURCH, writing with reference to the above, says: "It may perhaps interest you and your readers to learn that the Goudhurst Gas-Works, which the Kent County Gaslight and Coke Company, Limited, have agreed to purchase for £21,800, were offered to me in July, 1904, for £3000; and I am given to understand the undertaking was eventually sold for £2300. There have been so many similar Companies put on the market lately, that I think some action should be taken, if possible, to protect the gas profession and the investing public. To the Laindon Company the public are asked to subscribe £12,000. The undertaking consists of a very small water-works; but there are no gas-works at present, although in 1896 Parliament confirmed a Provisional Order giving to the Company then in existence powers to raise £4000 for the erection of gas-works, and £8000 for water-works, for the supply of these commodities in the parishes of Laindon and Little Burstead only, both of which parishes are but sparsely populated. A Company styling themselves "The Gas and Water Supplies and Construction Company, Ltd.," have written to me with reference to the acquisition of my Billericay works; but I will take care that if ever I do feel disposed to sell, it will not be to any speculators, who appear only too anxious to gull the public, and to bring gas undertakings generally into bad repute with investors of gas stock."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Peterborough Gas Bill, Southampton Gas Bill.

Bills read a second time and committed: Huddersfield Corporation Bill.

Bills reported: Carlisle Corporation Bill, Crediton Lighting and Power Bill, Newport Corporation Bill, Newtownards Urban District Council Bill, Thornton Urban District Gas Bill.

Bills read the third time and passed: Carlisle Corporation Bill, Crediton Lighting and Power Bill, Glamorgan and South Wales Water Bill, Thornton Urban District Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill presented and read the first time: Poole Corporation Water Bill.

Bill brought from the Lords, read the first time, and referred to the Examiners: Glamorgan and South Wales Water Bill.

Bill read a second time and committed: Water Provisional Order Bill.

Bills reported, with amendments: Cheltenham Gas Bill, Derby Gas Bill, Manchester Corporation Bill, Metropolitan Water Board Bill, North Sussex Gas and Water Bill, South Suburban Gas Bill.

Bills read the third time and passed: Peterborough Gas Bill, Southampton Gas Bill, Sutton, Southcoates, and Drypool Gas Bill.

Bill withdrawn: Sale of Coke Bill.

In answer to a question put by Mr. Rowlands, on Monday last week, the President of the Board of Trade (the Right Hon. D. Lloyd-George) said there was no obligation upon gas companies, so far as he was aware, to supply to consumers using penny-in-the-slot meters cards showing the record of the index, such as were furnished to consumers using ordinary meters. The Board of Trade had no power, without further legislation, to require gas companies to supply such cards. He was not prepared at present to express an opinion on the subject; but the point would be noted for consideration in the event of any Bill being introduced to amend the Gas Acts.

THE MODEL TESTING CLAUSES FOR GAS BILLS.

In the report of the proceedings on the Kidderminster Gas Bill which appeared in the "JOURNAL" for the 20th of March, reference was made by the Lord Chairman (the Earl of Onslow) to certain model testing clauses which had been drafted for insertion in Gas Bills; and it was stated that they had been accepted by the Company concerned. We gave the clauses as they then stood; but they have since been revised, and we believe have been settled as follows:—

1.—For the purposes of the Gas-Works Clauses Act, 1871, the prescribed testing-place shall be a testing-place which shall be provided by the on the lands described in the schedule to this Act before supplying, or within three months after beginning to supply, gas under the authority of this Act.

2.—The quality of the gas supplied by the shall, with respect to its illuminating power, be such as to produce, at the testing-place, when burned at the rate of 5 cubic feet per hour, a light equal in intensity to the light produced by 14 sperm candles of six to the pound, each consuming 120 grains of sperm per hour, and shall, as to its purity, be in all respects in accordance with the provisions of the Gas-Works Clauses Act, 1871.

3.—For testing the illuminating power of the gas, the burner to be used shall be that known as the "Metropolitan argand No. 2," the photometer shall be the bar photometer, the standard light shall be that supplied by Harcourt's 10-candle pentane lamp; and in making the test the burner shall be so used as to obtain from the gas, when burned at the rate aforesaid, the greatest amount of light: Provided that the Board of Trade may, on the application of the or any five consumers, approve the use of any other burner, photometer, or standard light which may appear to the Board to be more suitable for the testing.

4.—The shall, before supplying, or within three months after beginning to supply, gas under this Act, provide all the apparatus required by this Act for the testing of gas, and shall at all times keep the same in proper order and repair.

5.—All gas supplied by the to any consumer of gas shall be supplied at such pressure as to balance a column of water not less than 8-10ths of an inch in height at the main, or as near as may be to the junction therewith of the service-pipe supplying the consumer.

6.—Any gas examiner appointed under the Gas-Works Clauses Act, 1871, may, for the purposes of this Act, subject to the terms of his appointment, at the testing-place or elsewhere, not being the immediate approach to any railway bridge or railway station, as and when he thinks fit, test the pressure at which the gas is supplied, and for that purpose may open any street, road, passage, or place vested in, or under the control of, any local or road authority. The shall afford to the examiner all reasonable facilities for making the test; and two hours' previous notice shall be given to the of the time and place at which any testing for pressure elsewhere than at the testing-place will be conducted.

7.—No penalty shall be incurred by the for insufficiency of pressure, defect of illuminating power, or excess of impurity in the gas supplied by them in any case in respect of which it is proved that such insufficiency, defect, or excess was produced by an unavoidable cause or accident.

UNOPPOSED BILLS.

The Unopposed Bills Committee of the House of Commons, of which Mr. ALFRED EMMOTT is Chairman, had before them last Thursday and Friday the following Bills.

Derby Gas Bill.

The object of this Bill is to extend the limits of supply of the Derby Gas Company, to enable the Company to acquire the undertakings of the Spondon, Ockbrook, and Borrowash Gaslight and Coke Company, Limited, and the Mickleover and Etwall Gaslight and Coke Company, Limited, and for other purposes.

Mr. H. R. CRIPPS (of Messrs. Dyson and Co.) stated that the Bill was to empower the Derby Gas Company to acquire the undertakings of the two limited Companies named, who had not parliamentary powers, but who were now supplying gas within the area of the Derby Company. Their standard price of gas was 2s. 10d. per 1000 cubic feet; but the lowest price to their largest consumer was 2s. 1d.

Mr. W. WOOLLEY (of Messrs. Moody and Woolley, the Solicitors for the Bill), in reply to a question by the Chairman, said that the Spondon Company had raised capital to the extent of £10,000 by the issue of 1000 fully-paid shares of £10 each, and that the capital of the Mickleover Company was £9000, in £10 shares. The shareholders of the former Company were to receive, in exchange for every share, £10 of consolidated ordinary stock of the Derby Company; and those of the Mickleover Company, £90 of consolidated stock for every ten shares.

With respect to the amendment of section 39 of the Derby Company's Act of 1852 relating to the supply and price of gas for public lighting, by the insertion of the words "for lighting purposes" after the word "consumer," the Committee allowed the clause to pass.

Powers were also sought by the Bill, and were allowed by the Committee, for confirming an agreement between the Draycott Gas Company and the Derby Gas Company with reference to the supply of gas to the district of Shacklecross.

The Bill was ordered to be reported to the House for the third reading.

North Sussex Gas and Water Bill.

By this Bill, authority was sought, by the North Sussex Gas and Water Company, to supply water in certain parishes in Sussex, and to confer further powers upon the Company. Another object of the measure was to sanction the site upon which the gas-works had been erected; and they had also included the sanction of a new station. The capital was £12,000, and the cost of the works was estimated at £5000.

The Bill was ordered to be reported to the House for the third reading.

South Suburban Gas Bill.

By this Bill, further provisions are sought with respect to the gas supplied by the South Suburban Gas Company, and the price to be charged therefor, and for other purposes.

Mr. BROWNE (of Messrs. Dyson and Co.), for the promoters, stated that in 1893 the Company adopted a sliding-scale system. For every penny above 3s. 2d. per 1000 cubic feet that was charged, there was a reduction in the dividend; but the shareholders obtained no benefit until the price was reduced below 2s. 10d. Between the prices of 2s. 10d. and 3s. 2d. the shareholders neither gained nor lost. In the Bill of this session, they proposed to reduce the standard price of gas from 3s. 2d. to 3s. Coupled with this, they provided that the extra dividend be altered to 1s. 8d. instead of 1s. 3d. Their candle power was 15. The Bill proposed to reduce this to 13 candles; but it was not necessary to do so now, because they had fixed it at 14 candles. With reference to the sliding-scale, the Company was one whose affairs were closely watched by the local authorities concerned. A conference of these bodies took place; and an agreement with the local authorities on the point of the sliding-scale and the standard price was embodied in the new clause. This provided for a fixed standard price of 2s. 9d. If the price of gas was a penny above this, they suffered a reduction of dividend; but if it was a penny below, they would gain a benefit. The reduction of a penny per 1000 cubic feet amounted to £6800 in a year, and under the 1s. 8d. increase or reduction of dividend as the case might be, this meant that the consumers would benefit to the extent of £6100 in the year, and the shareholders to the extent of £700.

Sir *George Livesey*, in giving evidence, stated that Mr. Haward, the Comptroller of the London County Council, on one occasion gave evidence to the effect that the sliding-scale was becoming ineffective. The scale originally instituted gave about a proportion of 3 or 4 to 1—3 or 4 to the consumer to 1 to the shareholder—but it had become 6 or 7 to 1. Mr. Haward had said that it had now become almost inoperative. In the case of the South Metropolitan Company, it was 50,000 to the consumer to 8000 to the shareholder. Their extra dividend was 2s. 8d. on a 4 per cent. stock. When it was 2s. on a 4 per cent. stock, it meant 2s. 6d. on a 5 per cent. stock. In the South Suburban case, their dividend would not be increased unless they went below 2s. 9d.; and if they raised their price above the present charge of 2s. 6d., they would get less dividend.

The CHAIRMAN: If the price of coal is very high, the shareholder would not lose on this?

Witness: We should lose.

I mean it has a double action?—Yes.

Sir CHANDOS LEIGH: I take it that a consumer gets 4 or 5 and the shareholder 1?

Witness: It was nearly 8 to 1, and now it will be about 6 to 1.

The CHAIRMAN: You said it would be about 6 to 1; but these figures have not been worked out accurately, have they?

Witness: It is exactly that; it is as nearly 6 to 1 as possible.

The CHAIRMAN having expressed satisfaction with the alteration from 1s. 3d. to 1s. 8d., and also with the reduction of the illuminating power from 15 candles to 14, the Bill was ordered to be reported for the third reading.

Metropolitan Water Board Bill.

The object of the Bill is to empower the Metropolitan Water Board to make additional water, sewage, and other works, and to dispose of the sewage of certain districts in the valleys of the Rivers Lea and Stort, and for other purposes.

Mr. BROWNE (of Messrs. Dyson and Co.), in bringing the Bill before the Committee, said the promoters were asking for a sum of £180,000. This was the first Bill promoted by the Board since its constitution in the year 1902. It was desirable to get satisfactory financial clauses; and after considerable consultation with the Local Government Board, they thought they had now drafted financial legislation which would be useful to the Board in after years. At the suggestion of the Local Government Board, they had added two clauses with regard to the repayment of loans, and so on. Clause 61 was to authorize the Board to raise money by means of bills, if they saw fit, instead of by mortgages or by the creation and issue of Metropolitan Water Stock.

Sir CHANDOS LEIGH asked if the wording of the clause pretty well followed that of Nottingham and Liverpool.

Mr. BROWNE called attention to precedents in previous Acts, and said he thought the Committee might safely trust the financial wisdom of the Water Board. With regard to the question of the maximum amount, inasmuch as the London County Council had powers up to £2,000,000, he did not think it unreasonable that the Water Board should have power up to £1,000,000.

A MEMBER of the COMMITTEE remarked that they ought to have someone to tell them whether these were proper provisions from a public point of view.

Mr. BROWNE replied that the Bill had been carefully considered by the Local Government Board before making their report; and the promoters had complied with all their recommendations. The Local Government Board were satisfied. The only money they could borrow under the Bill was a sum of £180,000, which was required for reservoir extension.

The CHAIRMAN said it was not so much a question of the Local Government Board as one of an authority on finance.

Mr. BROWNE replied that there was nothing new in the clauses.

The CHAIRMAN said he did not think his Committee had the knowledge to carefully criticize them.

Mr. BROWNE: In spite of what you say, the Local Government Board would be the last to admit that they are not capable of criticizing a financial proposal of a body of this kind.

A MEMBER of the COMMITTEE: We are really concerned with the amount. The first Bill will be taken as a precedent to be followed by a great number of undertakings.

Mr. BROWNE said that, whichever way they raised the money in future Bills, the effect would be the same; and therefore the Bills would be carefully scrutinized by the authorities in charge of these matters.

The CHAIRMAN: I think we shall adjourn this. Of course, there is nothing to prevent us passing your Bill; but it is just to see if the Treasury or the Local Government Board have any remarks to offer. We will hear all the evidence.

Mr. *F. E. Harris*, the Comptroller of the Metropolitan Water Board, gave evidence; and the preamble of the Bill having been proved,

The CHAIRMAN said the Committee had decided to pass the Bill and report it; but they would call attention to the matter which had been discussed. He thought the consideration stage would be better he.l back.

Cheltenham Gas Bill.

The object of this Bill is to confer further powers upon the Cheltenham Gaslight and Coke Company, and to make further provisions with reference to the undertaking.

Mr. BROWNE, on behalf of the promoters, stated that they wished to extend their area of supply, which was at present limited to the parish of Cheltenham. The maximum price of gas was 4s. per 1000 cubic feet; but the actual price charged was 2s. 4d. There would be a considerable demand for gas in the area. The parishes of Southam, Woodmancote, and Bishop's Cleeve were adjacent to the present limits of supply, but were not supplied with gas; and it was expedient that the Company should be empowered to supply within these parishes.

The CHAIRMAN: Are you proposing any reduction in your 4s. maximum?

Mr. BROWNE: No; because, as a matter of fact, it would not affect the question.

The CHAIRMAN: But you are asking for authority to reduce your candle power?

Mr. BROWNE: Yes, to 14 candles.

The CHAIRMAN: You have a pretty high maximum. The question is whether or not it should be reduced.

Mr. BROWNE replied that the Bill had undergone a careful scrutiny by the Corporation, who were also the owners of an electric lighting undertaking in competition, and they were satisfied with the maximum price as it was. As a matter of fact, they did not even charge 2s. 4d.

per 1000 cubic feet, because this was subject to a statutory discount of 5 per cent.

Sir CHANDOS LEIGH asked Mr. Browne what he had to say with regard to clause 5, which has relation to the testing of gas, and how it would be affected by the proposed model clauses.

Mr. BROWNE replied that he understood the model clauses were under consideration, but had not been settled. They would prefer the clauses in their own Bill; but, of course, if by the time it reached the other House the model clauses were settled, it might be a case of necessity, and they would put it in. The provisions contained in the former Acts of the Company which would be inconsistent with the present provisions were repealed. The provisions of the Company's Act of 1896 imposed upon them penalties in the case of the presence in the gas of sulphur impurities other than sulphuretted hydrogen. They were restored to the position of the various companies who joined in the Sulphur Restrictions Bill which came before Mr. Cawley's Committee.

Mr. WYATT proved the preamble of the Bill.

The Committee ordered the measure to be reported.

Thornton Urban District Gas Bill.

The Chairman of Committees of the House of Lords (Lord Onslow) had before him last Tuesday this Bill, by which it is sought to empower the Urban District Council of Thornton, in Lancashire, to supply gas, and to provide for the transfer to the Council of such portion of the gas undertaking and plant of the Poulton-le-Fylde Urban District Council as is contained within the urban district of Thornton. It was mentioned that amended clauses with respect to testing the quality of the gas, &c., were contained in the Bill; and it was ordered to be reported as amended.

LONDON COUNTY COUNCIL (ELECTRIC SUPPLY) BILL.

The Select Committee of the House of Commons, of which Mr. LUKE WHITE is Chairman, have had under further consideration the Bill which proposes to confer powers on the London County Council with respect to the supply of electrical energy in the Administrative County of London and neighbouring places. In the course of the proceedings, matters of interest to the Gas Companies were incidentally touched upon. Previous points in regard to the opposition of the Gas Companies were given in the "JOURNAL" for the 8th inst., p. 385.

Mr. J. H. Rider, the Electrical Engineer of the London County Council, Mr. R. Hammond, electrical engineer, Mr. J. F. C. Snell, civil engineer, Mr. H. E. Haward, the Comptroller of the London County Council, and Mr. E. Harper, the Statistical Officer of the London County Council, having given evidence,

Mr. *John Hall*, Chairman of the Electricity Committee of the Bethnal Green Borough Council, who was one of the witnesses, said his Council obtained in 1899 a Provisional Order for the supply of electricity throughout the borough. At the present time they had no electricity. They were supplied with gas by the Gaslight and Coke and Commercial Companies.

Mr. LEWIS COWARD, K.C. (for the London County Council): At what price?

Witness: The Gaslight and Coke Company charge us 2s. 11d. per 1000 cubic feet, and the Commercial Company 2s. 4d.

I believe the Gaslight and Coke Company, where the gas is taken for driving engines, allow a discount, but of only 10 per cent. Of course, these prices compare very unfavourably with districts in London where, in addition to obtaining a supply of electricity, the inhabitants can have gas at 2s. per 1000 feet—that is, in the south of the Metropolis?—Yes.

Witness went on to say that his Council were advised that it would cost them between £40,000 and £50,000 to provide the requisite generating plant; and they expected a loss on the first year's working. Therefore they approached neighbouring Councils, with a view to obtaining a supply in bulk, and also the Charing Cross and City Supply Company; and offers had been received from these bodies. While the tenders were under consideration, they ascertained that the London County Council were proposing to seek powers to establish a bulk supply undertaking; and they came to the conclusion that it would be far preferable for them to obtain a supply from a central authority calculated to produce electricity on the most economical lines.

When the case for the Bill was concluded,

Dr. *T. E. Thorpe* was called by the Committee. He said he was Principal of the Government Laboratory; and he attended there at the request of the First Commissioner to offer any information desired respecting the effect more particularly of sulphur and sulphurous acid on vegetation, and especially in the public parks. He could only speak in general terms as to what would be the effect of burning coal in proximity to a park.

The CHAIRMAN: Assuming that 240,000 tons of coal are burned at Battersea, what would be the effect on the park?

Witness: Considering that coal contains about 1 per cent. of sulphur, and in burning gives twice its weight of sulphurous acid, it would mean, of course, that practically every hundredweight of coal would give off 2 lbs. of sulphurous acid, which would find its way into the air, and would eventually be brought down by the rain. This would affect vegetation, and would also affect, by its ultimately being converted into sulphuric acid, the stonework of buildings in the neighbourhood.

Can you suggest anything to obviate mischief arising from this?—The suggestions which I have to put before the Committee are these: In the first place, the consumer of coal has within his power the possibility of minimizing the amount of sulphur which he buys with the coal. He already takes steps to see that he gets a coal of reasonable calorific value, and with a fair proportion of ash. I should suggest, in addition to this, that he should stipulate that the amount of sulphur did not exceed a reasonable proportion. Next I suggest that he can, by the addition of small quantities of lime added to the coal—especially adding it in the form of milk of lime or lime water—very considerably minimize the amount of sulphurous acid which would escape on combustion.

The engineers called on behalf of the London County Council in their evidence have told the Committee that there would be a very considerably less quantity of coal burnt than is now consumed within the area of supply if the system gets into operation—that is to say, that a great number of works which are now using steam power would, under this scheme, adopt electricity, and that there would be a saving in some cases of two-thirds so far as the use of coal is concerned. If this is so, it would, would it not, be of great benefit to London?—No doubt we may expect that the total amount of coal burnt would be less under these circumstances than where each individual works maintains its own supply of energy. Of course, the energy eventually comes from the coal, and, to the extent that there is less coal burnt, there would be a proportionately less amount of sulphurous acid.

Do you consider that if the Committee were to pass a scheme such as that before it, there should be inserted some clause whereby the County Council should adopt some means such as you suggest in order to obviate the difficulties which would arise if these precautions were not taken?—That is the provision which I understand the First Commissioner of Works desires to have inserted.

Mr. LEWIS COWARD: Are you of opinion that the small manufacturers in London, by their inefficient working, are really the greatest sinners now?

Witness: No doubt, in a sense they are the greatest sinners; but the amount of the sin depends upon the quantity of coal burnt.

I suppose to some extent this depends upon how it is burnt?—No; when it is burnt, and wholly burnt, the result is the same.

By hand picking and screening, I take it, it is possible to minimize to a very large extent the injury complained of?—No doubt; and this is contained in the suggestion I have made—that the burner of the coal has it within his power to minimize the amount.

Witness agreed that the further removed from London the large generating stations were, the better it would be; but he added that one big station, if it was sufficiently and intelligently controlled and worked, was obviously better than a number of small ones.

In reply to Mr. NORMAN (a member of the Committee), witness said the methods of combustion were improving from a scientific point of view, in the sense that less smoke was evolved; but efficient combustion made really for efficient turning of sulphur into sulphurous acid. A lofty chimney was better than a low one; but there were atmospheric circumstances under which the products of consumption would eventually come down.

Mr. *E. G. Rivers*, of the Office of Works, and Major *W. C. Hussey*, Bailiff of the Royal Parks, also gave evidence.

After hearing evidence for the Willesden Urban District Council in opposition to the Bill, the Committee adjourned until to-day (Tuesday).

PORTSMOUTH WATER BILL.

This Bill, the object of which is to confer further powers upon the Portsmouth Water Company, extend their limits of supply, and authorize the construction of works and the raising of money, recently occupied for several days a Select Committee of the House of Lords, presided over by Lord LUDLOW.

Mr. BALFOUR BROWNE, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. C. C. HUTCHINSON appeared for the promoters. The Bill was opposed by the Portsmouth Corporation, represented by the Hon. J. D. FITZGERALD, K.C., Mr. A. J. RAM, K.C., and Mr. FLEETWOOD PRITCHARD; the London, Brighton, and South Coast Railway Company, by Mr. FREEMAN, K.C., Mr. MOON, K.C., and Mr. CLODE; the Gosport Water Company, by Mr. A. J. RAM, K.C., and Mr. F. N. KEEN; and the West Sussex County Council, by Mr. FREEMAN, K.C., and Mr. DILL.

Mr. BALFOUR BROWNE, in opening the case, said the Company was formed in 1856, and incorporated by an Act of the following year. The capital was to be £80,000, all told. Prior to that time, there was a Company supplying water, and the undertaking was purchased by the existing Company for £42,000. The sources of supply were from springs at the Farlington Marshes, near the northern shore of Langston Harbour, which was an arm of the sea running up part of the way east of Portsmouth. The total quantity of water supplied to the entire borough was 500,000 gallons daily. Under the Company, the sources of supply were changed. Certain springs at Havant were purchased, and a new pumping-station erected; the water yielded being of high quality. The works had had to be largely increased from time to time. Other springs had been purchased, and properties round them had also been bought, at a cost of from £60,000 to £70,000. The capital of the Company now was £550,498 in shares and £183,499 in borrowed money. A very small amount of this had not been raised—viz., £33,715 of share and £11,000 of loan capital; making a total of £45,000. This money was largely pledged by the Company for works which had been carried out or were in course of construction. One of the objects of the promoters was to buy some land above the Portsdown Hill reservoirs; but, so far as he knew, there was no opposition to this. With regard to finance, the Company's revenue had gone up steadily year by year. Their supply of water—the absolute minimum upon which they could rely—was 11 million gallons a day; and it was calculated that in 15 years the demand would be 4 million gallons a day beyond their present minimum. On the property of the London, Brighton, and South Coast Railway, there was an important spring, the water from which flowed into land in which they, as owners, were interested; and therefore they were riparian proprietors of the spring. The promoters proposed to take the whole of the water from it, and to compensate the Railway Company if they could show that they were damaged in any way. At one time they were opposed, and still were nominally, by the Portsmouth Corporation. About five years ago, the Corporation expressed a desire to purchase the Company's works; and at that time an agreement was come to for the sale of the undertaking. Unfortunately, the Corporation could not carry the ratepayers with them. They had again raised the question, and the owners were not unwilling now to sell, if the Corporation were prepared to carry out something like the terms, or proportionate terms, to those which were then agreed to. Negotiations had gone on until the last minute; but he thought the Committee could take it from him that Portsmouth, instead

of opposing the Bill, were prepared to support it, on the understanding that the Company were willing to sell their works to them on terms which were to all intents and purposes agreed.

Mr. FLEETWOOD PRITCHARD remarked that the Corporation and the Company had practically come to an agreement.

Mr. ERSKINE POLLOCK said that he appeared for a large body of landowners, representing more than 80,000 acres, who opposed the scheme. He thought they ought to know what the agreement was.

Mr. BALFOUR BROWNE said it was only fair that their opponents should know. The Company had agreed to sell if the sale could be effected at once, and they would transfer the Bill to the Corporation for them to carry out its proposals. But no mandate had yet been obtained from the ratepayers. Knowing this, the Corporation had entered into an agreement that the promoters should go on with the Bill, and in the meantime they were to spend capital on ordinary works. If next November the Corporation did not give notice of a Bill, then all the powers of the promoters were to go on as though there had been no such agreement as the one at which they had arrived. If, on the other hand, the Corporation gave notice of a Bill, then, until it could come before Parliament, the Company were not to spend any large sum on capital account without their consent; and if by the Bill they should make any material alteration in the terms of the agreement, or if Parliament should do so, then they would drop the Bill.

Mr. *Herbert Ashley*, the Chief Resident Engineer of the Company, was the first witness. He stated that last year steps were taken to start a small water undertaking having its centre at the village of Blendworth, and the Company were asked to supply water in bulk for the purposes of the enterprise. The scheme, however, was dropped. The water coming to Portsmouth at the present time was derived from three areas. That which they got at Havant and Bedhampton was derived from the rainfall; the soil of these places being almost entirely bare chalk. It was supposed that the rainfall, percolating through the chalk, endeavoured to find its way to the sea, but was broken by the Portsdown Ridge, where there was an upthrow of the chalk, and turned in an easterly direction, meeting that bar, and issued in springs. That being so, any attempt to draw water in large quantities from these districts would perhaps be unfortunate to the Company's present resources. With regard to the amount of revenue that would result from the construction of works, he said the average from their consumers had increased during the past five years from 6s. to 6s. 3d. per head. If they had 5000 consumers at this price, the revenue would be £1562 10s. per annum. In round figures, they would have an additional revenue of £2000 a year. The cost of the new works would be £169,000.

Professor *Percy Frankland* said he had visited a large village called Westbourne, and had found a small, clear stream running along the gutters of the main street. The water was often used for drinking purposes. He took a sample from a public-house, and the well from which it was obtained was surrounded by stables and a lavatory. His analysis of the water showed it to be of a very dangerous kind, and quite unfit for drinking purposes. At another place (some cottages) he found the water shockingly polluted. At Porchester, a large number of the wells had been condemned by the County Analyst.

Evidence was also given by Mr. *Ernest Hall*, senior partner of the firm of Messrs. Hall, Payne, and Goldsmith; Mr. *R. Bennett*, Head Master of the Hants County Council School at Porchester; and Mr. *W. Hayter*, a wheelwright of that town, who remarked that the water which was obtained from a well was "not fit to wash the floor with," and that the place was badly in need of a good supply.

Mr. *C. L. May*, a mail contractor of Hambledon, said he obtained his supply of water from a deep well, which very often became dry, and then the water was polluted with thick slime, worms, and slugs. Last summer, notices were issued warning people not to drink the water unless it was boiled and filtered.

Mr. FREEMAN, in stating the case of the West Sussex County Council, said they were objecting to the Bill because they were advised that the Company would be taking from them one of the resources which they themselves must rely upon in the future.

Mr. ERSKINE POLLOCK, on behalf of landowers, addressed the Committee, and called evidence in support of his statements.

Mr. *Baldwin Latham* said that, according to his experience, the suggested 53 gallons of water per head was an extraordinary allowance, and he could quote instances where the supply was only 21 gallons per head per day. He had thought of the effect of the proposed works on the properties of the landowners he represented, and considered that their present sources of supply would be jeopardized if the proposed works were carried out. He believed that by checking the waste the Company could provide for a larger population. He had heard that they required a million gallons of water for the purpose of scouring the wells; and he was surprised at the suggestion.

Mr. *C. L. Morgan*, the Chief Engineer of the London, Brighton, and South Coast Railway Company, said the minimum yield of the spring which the promoters were seeking to acquire from within the Company's boundaries was 600,000 gallons in time of drought. The spring was now enclosed, so as to prevent contamination of the water—the enclosing having been done by agreement with the Water Company. In the year 1902, the Company had a licence to take the water and enclose the well—the agreement to last four years. Now the Water Company were proposing to acquire the well from them. The spring was of the greatest importance to the Railway Company, because it yielded twice the quantity of water they bought from the Water Company annually. Taking their present consumption, he had estimated that the Railway Company could lay down works at a cost of about £12,000; and, including all charges, they could supply the whole of their water for about £1100 or £1200. At the present time they were paying the Water Company £3127; so that they could on their present consumption save about £2000 a year by utilizing the supply from the well. When they came to widen their railway, they would have to utilize the site of the spring; so that it was advisable that they should not be fettered in any way.

Mr. FREEMAN addressed the Committee on behalf of the Railway Company, and pointed out that it did not seem to be a public case that a water company should require to take from a railway company water which they wanted to use themselves, merely for the purpose of selling it back to them; and he submitted that the Brighton Company ought to be entitled to protection in respect of water which was upon their own land and of which they were the owners. Under the agreement referred to, if the Bill passed, the promoters would take away the whole of the water.

Mr. BALFOUR BROWNE, in reply, said that if the Railway Company could show that the water belonged to them, and that they could make use of it for the purpose they desired, they would get full compensation in money. If not, an injury was done to the Water Company. It was only a money matter, according to the evidence of Mr. Morgan, who said that he would be able to save money by carrying out his works; and if he could convince the Courts that the Water Company took the water away from him, he would be fully compensated.

The Committee were unanimously of opinion that the Bill should not be allowed to proceed so far as it was opposed.

Mr. HUTCHINSON said there were a great many provisions of the Bill that were not opposed.

It was pointed out that it would take some little time to amend the Bill; and, after an interval, the clauses were severally read, and, with amendments, agreed to.

The preamble was then passed as amended; and the Chairman was directed to report the Bill to the House.

LEGAL INTELLIGENCE.

ALLEGED OVERCHARGE FOR GAS AT UDDINGSTON.

The Reading of the Meter Upheld.

Sheriff-Substitute THOMSON, at Hamilton, has issued his decision in the action by Mr. J. Turner, writer, of Camphill, Uddingston, against the Bothwell and Uddingston Gas Company, Limited. The opening proceedings in the case were reported in the "JOURNAL" for April 10, p. 122. The pursuer asked the Court to find that a demand note for payment in respect of gas alleged to have been consumed in his house did not correctly detail the gas consumed by him, and to interdict the Company from enforcing the note; also to interdict the Company from interfering with his gas meter and fittings.

In his statement, the pursuer said that part of the area in the Uddingston district is 62·8 feet above sea level; while part of the area in the Bothwell district is 168 feet above sea level. The defenders' gasworks are situated at a spot 145 feet above sea level. The Company was originally incorporated as a private company, many years ago. At that time Bothwell and Uddingston were small residential villages, the houses in which were widely scattered. The pipes which were then laid for the supply of gas to the then existing houses are the pipes which are now in use. They are of small bore, and were, when laid, sufficient to supply the then demands. They are now inefficient and unfitted to supply the consumers at the prescribed statutory pressure. None of the pipes supplying the various districts of different levels are fitted with district governors. For several years past the pursuer's gas bill for the quarter commencing Oct. 30 and ending Jan. 30 averaged about £2 12s. 6d. For the quarter ending Jan. 30, 1905, the amount was only £2 13s. 1d. At that time the pursuer had reason to believe he was using a much larger quantity of gas than during the quarter ending Jan. 30, 1906. Under section 28 of the defenders' Gas Order of 1902, it is provided that "all gas supplied by the undertakers to any consumer of gas shall be supplied at such pressure as to balance from midnight to sunset a column of water not less than 6-10ths of an inch in height, and to balance from sunset to midnight a column of water not less than 8-10ths of an inch in height at the main as near as may be to the junction therewith of the service-pipe supplying such consumer." In or about the autumn of 1905, the defenders, without any intimation to the pursuer or to the other consumers, increased the pressure at which the gas was supplied to the consumers to almost three times the pressure at which it had previously been supplied. The defenders were called upon to produce the records of the pressure at which gas was delivered from their works between Oct. 30, 1905, and Jan. 30, 1906. The pursuers learned that complaints were being made by other consumers regarding the increase which had taken place in their gas bills. A public meeting of gas consumers was held on March 1. It was then found that the complaint of a large and unexplainable increase being charged against the gas consumers was almost universal; and a deputation was appointed to wait upon the Directors of the Company. At the meeting the deputation had with the Directors, they learned, for the first time, that the reason suggested as the cause of the increase was that the gas supplied had been delivered at a greatly increased pressure. The Directors explained that, on account of complaints which had been made by the inhabitants of the low-lying parts of the area of supply, they had made the alteration in the main referred to. The consequence was that a much larger quantity of gas was being delivered to the consumers. It was pointed out to the deputation that what the consumers should have done was to have regulated the stop-cock at the meter, to prevent the egress of more gas than could be consumed. The Directors did not assert that any intimation of the increase in the pressure, or advice of that nature, had been sent to the consumers. The pursuer believed and averred that the course adopted by the defenders was adopted because of two things: First, the defects in the system of piping for the delivery of gas to consumers, which rendered the flow of gas from the mains at the pressure prescribed by the defenders' Order impossible; and, second, the desire on the part of the defenders to avoid the loss which had arisen to them through their over-production of gas, consequent on the increased manufacture of bye-products. It was the intention of the defenders that the surplus gas, which in previous years had been lost to them, should be forced through the pipes and through the consumers' meters, with the view to the consumers paying for the same, and thereby to enhance the revenue of the defenders. The explanations given by the Directors showed that

they were delivering gas to the consumers at a pressure in excess of that authorized by their Gas Order. The quantity of gas specified in the demand note was not consumed by the pursuer between the dates specified. The gas delivered into the pursuer's premises under such conditions was not consumable, and was not consumed. The conditions under which the defenders delivered the gas into the pursuer's premises were such as to render it impossible that there could be efficient combustion. The pursuer is therefore entitled to a reduction in the amount of the sum claimed from him.

The defenders said that district governors would be useless in the lower levels. They explained that their mains had been increased as the population required, and that the system was so constructed and laid out as to supply efficiently the whole of the district. They denied the statements as to the production of gas, and said that the pursuer had no concern with the manner in which they carried on their business. The new 12-inch main was completed in April, 1905. It was introduced to provide a better supply for Uddingston, from which there had been complaints of lack of supply. The larger main carried about double the amount which was carried by the former main; and its use had the effect of increasing the volume of gas delivered to consumers supplied through it. After the introduction of the new main, the defenders reduced the pressure of gas to Uddingston. The construction of the new main was common knowledge in the district. It was a consumer's duty to regulate his gas supply to his own requirements. The pressures mentioned in section 28 of the defenders' Gas Order were minimum and not standard pressures. It was impossible for the defenders' inspector to examine all the meters in the district on the particular dates mentioned in the demand order. The index of the pursuer's meter was taken on Oct. 25, 1905, and again on Jan. 31, 1906. The meter had, under the order of the Court, pronounced on April 6, 1906, been tested by the Official Inspector at the Government Testing-Station in Edinburgh, and certified to be correct.

It was pleaded that the action was irrelevant and incompetent; that the pursuer, having consumed the quantity of gas specified, was liable to pay the charge therefore; and that the meter in the pursuer's house having been tested in accordance with the provisions of the statutes by the Official Inspector, and having been certified as registering correctly, the pursuer was bound to pay for the amount of gas registered by the meter as consumed by him.

The SHERIFF dismisses the action, and finds the defender liable in expenses. In an opinion which he has written he says: The first prayer of the petition I dismiss without hesitation. It is based upon the assumption that the Gas Order of 1902 prescribes a "standard pressure," which cannot legally be exceeded. It seems to me, however, that this assumption finds no warrant from the terms of the Order. The Order, as I read it, is perfectly clear. It imposes an obligation upon the defenders to supply gas at a specified minimum pressure; but it certainly does not impose any restriction against an increase of this minimum pressure. In increasing this pressure, therefore, the defenders cannot be said to be infringing the terms of the Order. The second and succeeding prayers of the petition are based upon the assumption that the demand note served by the defenders upon the pursuer, claiming payment for 30,500 cubic feet of gas, is incorrect in respect that it overstates the quantity consumed. The quantity actually consumed must, of course, be paid for; and a dispute as to this quantity raises a pure question of fact. Now, with reference to the meters, which are universally supplied to register the quantity of gas passing into a house, section 20 of the Gas-Works Clauses Act, 1871, prescribes as follows: "The register of the meter shall be *primâ facie* evidence of the quantity of gas consumed, and in respect of which any rent is charged and sought to be recovered by the undertakers." It is not disputed that the quantity claimed in the demand note was the quantity actually registered by pursuer's meter, nor is it any longer disputed that the meter (which has been tested and found correct by the statutory inspector) correctly registered the quantity which passed through it. The result would seem to be that the register of the meter is not merely *primâ facie*, but is in this case conclusive evidence "of the quantity of gas consumed;" and that the pursuer must accordingly pay the sum claimed in the demand note. The only answer which the pursuer makes is that the gas was supplied to, and forced through, the meter at such a high pressure that it was not entirely consumed; and he attempts to differentiate between the quantity supplied and the quantity consumed, admitting liability only for the latter. The gas statutes hardly seem to warrant this distinction, and gas bills are paid from day to day on the basis of the meter register, and not on the results of a quantitative analysis by an expert chemist. But in any case the pursuer had a remedy within his own power. He could have controlled the supply so as to make it and the consumption practically correspond. He admitted this in argument, but submitted that he had received no notice from the defenders of the increase of pressure, and was unaware of it. I cannot, however, find any legal ground for holding that a gas company is bound to inform consumers of an increase of pressure. Perhaps it would be fair for them to do so; but I cannot hold that they are legally bound to do it. As a matter of fact, pressure frequently varies—*e.g.*, in some places at the hour when shops close—but consumers must just protect themselves and regulate the pressure by means of the stopcock at the outlet of the meter. I therefore hold that the demand note is correctly stated and must be given effect to.

The Wakefield District Water Dispute.

In the Court of Appeal a few days ago, Lords Justices Vaughan Williams, Romer, and Stirling had before them the action brought by the Soothill Upper Urban District Council against the Wakefield Rural District Council and the Urban District Council of East and West Ardsley, under circumstances which have been reported in the "JOURNAL" (see Vol. XCI., p. 444). Mr. Micklem, K.C., who appeared for the defendants, explained that the action was tried by their Lordships last year, and judgment was delivered in August. It was brought by the plaintiff Council against the two defendant Councils in order to recover payment which they alleged ought to be made under certain agreements in virtue of which water was to be supplied. Their Lordships gave judgment for the appellants (the defendants) in respect of the main agreement of 1895; and the effect was to throw the parties back on earlier agreements. Then the point was argued whether these were also void, because there was no penalty clause inserted. The Court, by a majority, decided against the appellants on this point; and therefore the parties were bound by the earlier agreements. The matter stood over in order that minutes might be agreed upon mainly dealing with the costs of the action and with the form of the order under the agreements; and the matter now came on for argument on this point. After hearing Counsel for the plaintiffs, Lord Justice Romer delivered the judgment of the Court. He said that, in the peculiar circumstances of the case, they thought, after careful consideration of the various points arising upon it, that justice would be done by making no order as to costs, either in that Court or in the one below. The plaintiffs would, of course, have to pay the costs of the Wakefield Council. An order was made accordingly.

Charge of Stealing Gas-Mains.

At the Mansfield Petty Sessions last week, Thomas Paling, a labourer, was charged with stealing 2 tons of gas-mains, value £7, the property of the Kirkby-in-Ashfield Urban District Council. Defendant pleaded guilty. Mr. E. B. Hibbert, who prosecuted, remarked that the Council had been taking up old mains and replacing them with new ones; the old ones being stored at the road side. For some time Mr. S. Shadbolt, the Gas Manager, had noticed that pipes were missing; and in consequence he informed the police. Mr. Shadbolt testified that on May 8 he definitely missed 17 pipes, 9 feet long and 6 inches in diameter; the whole weighing 2 tons. A marine store dealer said that defendant brought to him a number of pipes which were broken up, and which he said he had procured from a contractor at Sutton-in-Ashfield. A sentence of one month's hard labour was passed.

Gas-Works Results at Hinckley.

At the last meeting of the Hinckley Urban District Council, the Gas Manager (Mr. F. Lee) was heartily congratulated by the members on the satisfactory nature of his report regarding the past year's working of the department. There was a net profit of £2956, or £682 more than in the previous year, notwithstanding a reduction in the price of gas and cooker-rents, which represented a saving of over £700 to the consumers. The coal used was 6008 tons, as compared with 5664 tons; the quantity of gas manufactured being about 64 million cubic feet, against 57 million feet. There was thus an increased make of 7 million feet; but at the same time 8½ million feet more gas was sold. This represented an increased sale of close upon 15½ per cent. During the year the price of gas for lighting purposes was reduced 2d. per 1000 cubic feet; the net prices now being 3s. for quantities up to 100,000 feet, 2s. 10d. over 100,000 and under 250,000 feet, and 2s. 7d. for more than 250,000 feet. The charge for gas used for engines and business purposes other than lighting was also reduced according to consumption; the price for over 100,000 cubic feet per quarter being 1s. 9d. per 1000 feet. Mr. Wills, the Chairman of the Gas Committee, said the past year was the best they had ever had. The profit is to be disposed of as follows: £500 to sinking fund, £300 to reserve, and £1445 to capital account.

Reduction in Price at Evesham.

The Mayor of Evesham (Mr. Fisher), in presenting to the Town Council the accounts for the year ending March 31, was able to report that the revenue showed marked progress. The receipts from the sale of gas, he said, including public lighting, amounted to £5572, or an increase of £510. The increase in receipts from prepayment meters was £336. Residuals showed an increase of £319. The total receipts were £7957, and the expenditure £5463; leaving a balance of £2494, against £2165 for the previous year. The discounts for prompt payment of accounts had swallowed up £463. £715 had been written off for depreciation; and the balance carried to profit and loss account was £912. The outstanding balance on loan account was £3491. In view of the very satisfactory condition of the undertaking, the Committee recommended the Council to reduce the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet, with the usual discounts. He had had the pleasure of meeting the Auditor, Mr. Leicester, after he had examined the accounts for the year; and Mr. Leicester spoke very highly of the undertaking and the way it was conducted by the Manager (Mr. Percy H. Fletcher). Alderman Hughes, who seconded the adoption of the accounts, attributed the satisfactory condition of the undertaking to the policy pursued by the Committee in carrying out alterations and improvements from the revenue, and not by borrowing money. In eighteen months another loan would be paid off; and it would then be possible to make a further reduction in price. The minutes were adopted.

Sale of Debentures.—At a local sale by auction, Messrs. Crews and Son disposed of twenty perpetual 4 per cent. debentures of £50 each in the Exmouth Gas Company. All sold at £50 10s. each, except two, which realized £50 15s.

Southport Gas Estate.—The year's working of the Southport Corporation Gas Estate has been a satisfactory one, judging from a tabulated statement presented to the Town Council. The figures show that, for the year ended March 31 last, 329,157,000 cubic feet of coal gas were made, or an increase of 52,500,000 feet as compared with the previous year. The carburetted water gas made amounted to 156,158,000 feet, or a decrease of 30,500,000 feet. This gives a total of 485,315,000 feet, or an increase of 22,103,000 feet as compared with the previous year's record. Of this quantity, 471,669,300 feet were sold or disposed of free—an increase of 17,000,000 feet, or 3·8 per cent. The unaccounted-for gas equalled 2·31 per cent. The profits amounted to £14,500; and £13,000 was transferred to the relief of the rates.

MISCELLANEOUS NEWS.

WELSBACH SUCCESS IN A FREE MARKET.

On all hands, in a large meeting of shareholders in the Welsbach Incandescent Gas-Light Company, at Winchester House last Tuesday, was satisfaction expressed with the tale that the Chairman (Mr. Miles W. Mattinson, K.C.) had to tell, in submitting the first resolution, referring to the adoption of the report and the declaration of a dividend at the rate of 6 per cent. per annum on the preference shares, and of 5 per cent. on the ordinary shares, both less income-tax.

REDUCTIONS IN PRICE AND A GREATER VOLUME OF BUSINESS.

Mr. Mattinson's first expression was one of gladness that the accounts enabled the Directors to recommend the same dividends as were paid last year, and to place to reserve the substantial sum of £15,000. To do this, he explained, it was necessary to trench to the extent of a little over £3000 on the carry-over; but, as the carry-over for the current year would still amount to more than £7000 (which is the rough equivalent of 1 per cent. on the ordinary stock), the Directors felt justified in recommending this course. The total profits for the year from all sources, he continued, amounted to £84,899. This compared with £91,601 last year, or a reduction of £6700. The return upon the investment in the Austrian Company was up on the year by £6170; but this was more than counterbalanced by the falling off in the net profits of the English business. He was glad to say that this falling off was not attributable to any diminution in the extent and volume of their trade. The volume had been maintained at a higher level than in the preceding year. Nor was it attributable to any increase of the expenditure or working costs. The expenditure was scrutinized with scrupulous care; and the dividends of the last three years were all the products of thrift and economy. And he was pleased to be able to tell the shareholders that it had been possible throughout the year to administer the Company upon the same economical lines as were first put into operation three or four years ago. The reduction in the net profits was wholly attributable to the fact that, in the past year, the Company had obtained a less price for the principal article of their manufacture. As he announced twelve months ago, the conditions of trade were then such that it was necessary to put into force a reduction which was substantially equal to 25 per cent. of the price. He had seen this reduction spoken of as a reduction equal to 25 per cent. of the profits of the Company upon the principal article concerned. This was quite a mistake. The reduction was a great deal more than that. It was a reduction on the gross turnover; and a reduction of 25 per cent. on the gross turnover was a much more serious matter than a reduction of 25 per cent. of the net profits. It might be taken from him, without making public the precise figure, that upon the Company's huge mantle trade 25 per cent. reduction in the price was represented by a much larger figure than the £13,000 which was the amount of the diminution of the English profits this year. The difference between this figure, whatever it might be, and the £13,000 represented a contribution to the situation which it had been possible to make by means of increased sales and by means of further trade in directions other than that of mantles.

MONOPOLY AND A FREE MARKET.

This reduction in the price of mantles of which he had spoken was an absolutely inevitable step in the progress of the Company from the monopoly, or the attempted monopoly stage, of its existence to that free market to which sooner or later it was bound to come if it was to succeed as a Company. It had fallen to the lot of the Board to have the direction of the Company's affairs during this transition period from monopoly to a free market. The shareholders would recollect that, during the last three or four years, the Board had had to put into operation two large reductions in price. The first was made about four years ago. Upon that occasion there was a reduction from 7½d., which was the then standard price, to 6d.—a large reduction, but not so large as the reduction of last year. But they had a reserve to fall back upon to meet the reduction, because simultaneously with the reduction they were able to put into operation economies which amounted to something between £50,000 and £60,000 per annum in the costs of administration. These economies were able to do a good deal more than fill up the gap which was represented by a drop from 7½d. to 6d.; and these economies, in conjunction with other amelioration of the situation, were the foundation of the dividends which the shareholders had obtained during the last three years. Last year they reached a further stage. Again it was necessary to put into operation a reduction—this time from 6d. to 4½d. But unfortunately they had no £50,000 or £60,000 to fall back upon. Economies of this description could be put into force once; and when they had realized them, they could not put them into operation again, because if their work had been done there was no room for further drastic economies. They had had to look for it in other directions; but they had the handsome profit of £48,000 upon the English business alone. This might not be regarded as a large sum by those persons—if there were any left—who foolishly persisted in basing their expectations of what the Company could accomplish upon its absurd original capitalization, for which, he might add, no member of the existing Board was in the slightest degree responsible. But putting aside persons who insisted in living in another world altogether, so far as the facts of the situation were concerned, and coming to those who were content to take things as they were, and who had any knowledge of things as they obtained in this trade, this profit would be regarded in a different light.

THE PAST AND THE PRESENT.

The Company had now issued eight balance-sheets and profit and loss accounts—four were under the old *régime* and four under the new; and it would be interesting to pause for a moment to ask broadly what had been the results under the one *régime* and the other. Eight years ago, the shareholders purchased a monopoly as they thought. Monopoly was a tree that flourished most luxuriously in its early years, and which, by the law of its growth, had a tendency to wither and fade as it approached the end of its existence. Therefore, they would have expected that, in the first period of their monopoly, there would have been great results tapering away into smaller and smaller ones as the end of the monopoly approached. But the truth was that the very reverse had happened in this instance. Some of the shareholders would remember that, on a former occasion, he made a detailed examination of the profits of the English Company in each year from its inception; and he made the adjustments which were necessary in the earlier figures, owing to the fact that in certain years profits appeared to be better than they really were by transfers from reserve to make up depreciations in stock. Bearing this in mind, the result was this: The net profit of the English Company in the first four years of its existence averaged about £15,000 a year; the net profit in the last four years had averaged about £54,000 a year. And this though the monopoly (such as it was) was dwindling away; and the average price obtained for the principal article of manufacture was, in the last four years, little more than half that obtained in the first four years.

PROMOTION OF MR. FLETCHER TO THE BOARD.

With regard to the future, he did not think he ought to attempt any forecast. He had hitherto scrupulously abstained from doing so. They were in a highly competitive trade—a highly competitive trade in which, to a certain extent, the pace was set by others. This being so, he thought it would be most hazardous for any person to predict the probable outcome of events from year to year. He considered in many respects that the Company were most admirably equipped to meet whatever difficulties might arise in the situation from time to time. He felt confidence in saying, however, that their able Manager, Mr. Laurence Fletcher (whom the shareholders would see from the report had obtained well-earned promotion to a seat on the Board), would, in the shareholders' interests, make the best of the conditions whatever they might be.

PROFITS, LAW COSTS, ETC.

Comment was then made by the Chairman on the items of the balance-sheet. Only two or three points need be noticed here. He first attended to the gross profit of the English Company, £47,915, and then stated that the dividend from the Austrian Company was £36,609. Another interesting item was that of law expenses. It would be seen that in the past year law had cost them £50 16s. 9d. [Great applause greeted this statement.] The figure, the Chairman proceeded, compared with £967 the year before; and he thought it was a still more gratifying figure when it was compared with four years ago, when the figure was £16,360, and five years ago, when it was £15,000 odd. There was derisive laughter as the Chairman added that he hoped the shareholders felt they had got value for the law indulged in by the old Board. Passing over other comparative figures, the Chairman said that, in a Company of this kind, they could get sufficiently near the balance of liquid assets by adding together the cash and investments, debtors, and stock-in-trade, and deducting the creditors. Applying this system, their balance of liquid assets was last year £233,723; and, on the same method of calculation, their assets that day amounted to £241,545. In his judgment, this was a strong position.

THE OSMIUM LIGHT.

Coming to the Austrian Company, since last year the Austrian Government had formally sanctioned the new statutes of the Austrian Company, which were necessary to give final and legal effect to the separation of the "A" and "B" undertakings. This represented the snapping of the last link in the chain which tied and bound the Company for seven years to the dubious fortunes of the Osmium light. It was an ill-assorted union; and the dissolution of the connection, now that it had come, had been a happy release to at least one of the parties. Of course, they could not shut their eyes to what had been passing during the last two years, since they ceased to have any interest—such as it was—in the Osmium light; and he felt justified in saying that, if the arrangement for dissolution had not been made when it was, the shareholders would have been no nearer getting a dividend than they were two years ago, or than they were eight years ago. On the contrary, the free assets of the Austrian Company would have continued to be depleted, in order to meet the charges of the Osmium light, and other large and indefinite liabilities of the most serious character would have been still hanging over the Company; and he did not believe, either in respect of these accounts or those of next year (into which the dividend of the Austrian Company just declared would come), that it would have been possible for the shareholders to have got £36,000 in cash from the Austrian Company as a contribution to their revenue. The separation of the two undertakings had been, from his point of view, a complete and unalloyed success.

THE AUSTRIAN MANTLE PATENT AND THE FLUID BUSINESS.

During the last two years in which they had been substantially in control of the Austrian Company, it had had considerable difficulties to contend with, just as the English Company had; and it would not have surprised him in view of the conditions then developing, if there might be no progress on the part of the Austrian Company, but even some retrogression, during the last two years. In these two years, the Austrian mantle patent had absolutely expired. Now the mantle patent in Austria was a much more real monopoly than the mantle patent in England; Continental patent laws were more effectual than the English patent laws. Therefore up to a couple of years ago, the Austrian Company were getting the full benefit of their legal monopoly; but since the patent had absolutely expired—that was to say, during the greater part of the last two years—the Company had had to face large reductions in the open market. Regarding the larger and more profitable branch of the business in Austria—the fluid manufacture—it had had lately to contend, on the one hand, with some reduction in the price of the article itself, and, on the other hand, with a very considerable enhancement in the cost of the principal constituent of its manufacture. It was quite true that, owing to the prudent forethought of the Austrian Company, these adverse conditions had been mitigated by existing contracts and other arrangements. The reasons why the Austrian Company had done so well, in spite of these

adverse conditions, were he thought three—First, they had got rid of the loss of the Osmium undertaking; secondly, separation of the two undertakings meant the return to the gas undertaking from the electric-light undertaking of large sums of money which had been remuneratively employed in the business of the gas undertaking, instead of lying dormant in the other undertaking; and, thirdly, he thought it was possible they might take some credit to themselves for, with the hearty co-operation of their Austrian colleagues, the introduction of improved methods in the direction of economy which had been effected. The conditions of the Austrian Company of some eight or nine years ago could not again be reproduced—the conditions under which they made enormous profits, which, in an unhappy hour, led someone to pay nearly £1000 for each £83 share in the Company. At that time, the Austrian Company were getting for their fluid between six and seven times the price they now obtained; while they were paying for monazite sand about one-sixth of the price now being paid. Such a conjunction of circumstances for the production of high profits could not, and would not, return. Although their bargain must always remain a very bad one, he thought it was likely to turn out much better than was supposed three years ago.

MONAZITE SAND.

After Mr. W. W. Wright had seconded the motion, there was a short discussion—the remarks being mostly of a congratulatory nature. The Board were also complimented upon the elevation of Mr. Fletcher to the position of Managing-Director. A shareholder inquired as to the position of the monazite sand; but the Chairman absolutely declined to be drawn into giving information which it was not to the interests of the Company to impart. He did, however, say that nothing had happened which had not been expected so far as their Austrian colleagues were concerned. Although the situation was a very curious one, he did not think, on the whole, that, in the business scrimmage on the Continent in regard to monazite sand and the price of fluid, the Austrian Company were likely to come out second-best.

The ordinary formal business was passed through; and the proceedings ended with cordial thanks to the Board and staff.

GAS SUPPLY IN SHANGHAI.

We have received from the Engineer of the Shanghai Gas Company, Limited (Mr. H. King Hiller), the report and accounts for the year ending Dec. 31 last—the 42nd in the Company's existence.

The report states that the private consumption of gas last year increased by 63,953,278 cubic feet, or 21·66 per cent. Public lighting in the British and American Settlements remained about the same as in 1904; but in the French Concession, there was an increase to the extent of 85·9 per cent. in incandescent gas lighting in place of electric light. For motive power, 7,182,100 cubic feet, or 25·27 per cent., more gas were consumed last year than in the preceding twelve months. There were 3228 tons more coal carbonized, and 60,530,100 cubic feet more gas produced, than in 1904. The receipts for residuals were higher, owing to the favourable price obtained for coke; but there was a considerable falling off in the sale of tar. A satisfactory business was done in gas-fittings. Appended to the Directors' report is one by the Engineer, who gives particulars of the structural changes on the works and of the gas production. Foundations for new purifiers of 3 million cubic feet daily capacity were put in; and the old retort-house has been taken down and the foundations of a new one are finished. The steel and iron work for a new million cubic feet spiral-guided holder has arrived, and its erection will shortly be commenced. The quantity of coal carbonized was 33,975 tons; and the gas production was 394,693,500 cubic feet—being at the rate of 11,600 cubic feet per ton. The quantity sold was 368,854,495 cubic feet, which was an increase of 21·25 per cent. on the sale in 1904. The loss in distribution was 5·59 per cent. New and enlarged mains to the extent of 12,435 yards have been laid; a new 6-inch steel high-pressure main from the works to the Hongkew distributing station, with compressor-engines, was completed in July; and a 12-inch "booster" main was laid to the central district.

The accounts accompanying the reports show that the sale of gas produced a revenue of 448,678 taels; residuals yielded 61,845 taels; the profit on the fittings account was 19,159 taels; and the total revenue was 529,682 taels. The expenditure on the manufacture of gas came to 255,997 taels (coal costing 191,232 taels); on distribution, to 28,228 taels; and management and general charges came to 33,783 taels—leaving a balance of 211,674 taels. After providing for the payment of interest on debentures, and making allowance for bad and doubtful debts, the net profit at the close of the year amounted to 196,252 taels. After crediting the profit and loss account with 8011 taels brought forward, and deducting the amount of the interim dividend, at the rate of 7 per cent., paid in July, the balance was 148,263 taels, which the Directors recommended should be appropriated as follows: Final dividend at the rate of 7 per cent., 56,000 taels; bonus at the rate of 1·50 taels per share, 24,000 taels; allowance for depreciation of land, buildings, plant, and furniture, 37,245 taels; and transferred to the depreciation and renewals account, 20,000 taels—leaving 11,018 taels to be carried forward.

At the meeting at which the reports and accounts were presented, the Chairman (Mr. E. Jenner Hogg) referred to their very satisfactory character. There had, he said, been a total increase of 96,781 taels, or 22·35 per cent., in the receipts, and of 19·82 per cent. in the sales. On the other hand, the expenses were higher by 65,772 taels. The reports and accounts showed that the Directors had to continually add to the plant to meet the demands of the Company's increasing business. The fact that they had been practically working at full load during the past winter showed that the extensions referred to had not been taken in hand at all too soon. The delivery of gas during the usual heavy night at the Chinese New Year was 2,232,000 cubic feet, against 1,855,200 cubic feet in 1904 and 892,000 cubic feet in 1902. There had been a satisfactory increase in the consumption of gas for engines; but it was surprising that more use was not made of it for heating purposes, in view of its great convenience, cleanliness, and economy, if reasonably looked after. The dislocation of business in Japan in consequence of the war, interfered with the delivery of coal; and it had been found advisable to import some from Australia, which was giving good results. A new agreement had been arranged with the Municipal Council for a period of seven years; and it ought to work satisfactorily for all parties. In conclusion, the Chairman expressed the appreciation of the Directors of the good work done by the staff during the year; laying special emphasis on their loyalty in the period of stress and anxiety caused by the riots last December. He trusted the shareholders would sanction a practical recognition, in the shape of a bonus, of the excellent service then rendered.

The report and accounts were adopted, the final dividend and bonus were ordered to be paid, and the apportionment of a bonus of 5000 taels among the European staff of the Company was sanctioned. This gift was acknowledged by the Secretary (Mr. G. R. Wingrove).

BIRMINGHAM CORPORATION GAS SUPPLY.

The Naphthalene Difficulty—The Past Year's Working.

At a Special Meeting of the Birmingham Town Council to-day, the Gas Committee will present their report for the twelve months ending the 31st of March, which was briefly noticed in the "JOURNAL" last week. It opens with a list of the tenders accepted, and contracts entered into, for the erection of plant and machinery, the largest of which was with Messrs. W. C. Holmes and Co., for two Pelouze and Audouin tar-extractors in connection with the carburetted water-gas plant. The Committee report that the deposit of naphthalene in the mains and service-pipes during the summer months has for years occasioned inconvenience to consumers by partially, and in some cases wholly, stopping the supply of gas; and much expense has consequently been thrown upon the Department from time to time in removing the obstruction. In May, 1900, the Committee reported to the Council that they had provided additional condensing plant at one of their large works, as it was thought that a more effective condensation of the gas would cause the naphthalene to be deposited with the tar in the wells on the works, instead of being carried forward with the gas into the mains and service-pipes. The results obtained were, however, only partially successful; and the Committee have since examined several other processes in operation. They point out that great diversity of opinion and practice in connection with this matter exists throughout the country; and from inquiries made it is found that the system of eliminating naphthalene which is most efficacious in one locality has failed in another. The Committee say that the most successful methods now in operation are those which include the passing of the gas through a solvent possessing an affinity for naphthalene, which is arrested and retained in the liquid to a sufficient extent to prevent deposit in the mains without lowering the quality of the gas distributed; and, after careful consideration, it is on these lines that they are endeavouring to overcome the difficulty. They have decided to instal apparatus at the Saltley, Nechells, and Windsor Street works for this purpose, and have entered into contracts for the necessary plant, some of which is now fixed and ready for use. They have also entered into contracts for the purchase of the necessary solvent required during the current season for use in the plant, which they hope will afford considerable relief during this summer, and ultimately, when all the plant is in good working order, permanently overcome the difficulty.

Accompanying the report is the statement of accounts. They show that the amount expended on capital account during the twelve months covered by the report was £57,038, of which £34,672 was for the extension of buildings and manufacturing plant, £6421 for new mains, and £15,945 for new meters. These items brought up the total outlay on the undertaking to £2,623,942; but as a sum of £59,531 was deducted for buildings and plant abandoned, plant transferred to stock, &c., the total stands at £2,564,411, leaving a balance of £344,537. The revenue amounted to £892,768, against £877,241 in the previous year; while the expenditure was £714,452, compared with £704,402. The balance carried to the profit and loss account is £178,316; whereas this time last year it was £172,839. After payment of interest, annuities, and sinking-fund charges, the net profit is £54,546, which, as provided by statute, will be paid over to the Finance Committee in aid of the improvement rate. The following are the contributions for public purposes from the gas undertaking for the year ending March 31: Improvement rate, as above, £54,546; do., interest on reserve fund, £4000; public lighting within the city, £9045; court lighting, do., £2251; public and court lighting outside the city, £3971—total, £73,813. The gas sold in 1904-5 was 6,293,810,600 cubic feet, compared with 6,565,642,500 cubic feet in the year 1905-6; being an increase of 271,831,900 cubic feet, or at the rate of 4·3 per cent. There were 668 new services laid on; and the total number of cookers supplied to prepayment consumers was brought up to 27,226—an addition of 7397. At the end of the financial year, 43,169 prepayment meters had been fixed, or 6794 more than at the corresponding period in 1905. The bulk of coal and cannel carbonized was 541,219 tons; and the estimated quantities of residuals produced were: Coke, 270,937 tons; breeze, 70,373 tons; tar, 6,525,521 gallons; and ammoniacal liquor, 19,595,577 gallons.

The London County Council and Gas and Meter Testing.—Estimated expenditures were approved last Tuesday, by the London County Council, for the financial year ending March 31, 1907, amounting to £4400 for gas testing, and £9025 for meter testing. These amounts were £426 and £653 respectively in excess of last year's expenditure on similar accounts. The estimated expenditure recoverable from gas companies for gas testing for the year 1906-7 is £250, and the fees for gas-meter testing are £7000; being an increase of £26 and £325 respectively.

GAS-WORKS PROFITS AT NOTTINGHAM.

Relief of Rates v. Ample Reserve Fund.

At the Quarterly Meeting of the Nottingham City Council on Monday last week, the annual budget, which contained a proposal by the Finance Committee to levy an increased rate of 2d. in the pound, was submitted.

In the course of his speech, in moving the adoption of the Committee's report, the Chairman (Alderman Fraser) referred to the requirements of the Corporation in the current financial year, and indicated the departments to which they might look to furnish the funds to meet them. He said they would require for Town Council purposes £367,174, and for education £85,029—a total of £452,203. They would receive in rents and tolls £60,363, from exchequer sources £22,050, from the tramways £15,000, and from the Electricity Department £10,000. The Bridge Estate brought in £5809, which was about £200 more than last year. From the Gas Department they took £27,000—that being the same amount as before. In dealing with this department, he said they were faced with the difficulty of there being no completed statement of accounts in connection with it. Every year when the rate was to be moved, the unfortunate person who had to move it had to do so without having the completed accounts of the undertaking; and though he had good reason to believe that the estimated profits exceeded £30,000, and ought to double this amount, he did not know, as a matter of fact from the certified accounts, what the actual profit was, though it might be £35,000. He ventured to submit to Mr. Harlow (the Chairman) and his Committee that there was no reason why their accounts should not be made up in time for the annual statement. He felt that the Gas Department ought to bring itself into line with the other departments of the Corporation, and they would then know the exact profit earned by them. If they could not get this, they were taking, as it were, a leap in the dark in putting down £27,000. It might be that, when the accounts were completed, a much larger sum would be found to have been earned, and that with this addition he might have asked the Council to sanction a rate of the same amount as last year. For want of the figures, however, he had to follow—in the dark somewhat—the course taken last year, and be content with the small sum of £27,000. They would receive in contributions from the various Committees a total of £147,186, from which sum they made grants to the University College and the Free Library amounting to £7507; leaving a balance of £139,679. If they deducted this from the total expenditure, there was a final balance of £312,524. If these figures remained unaltered, he must ask the Council to vote a rate of 6s. in the pound, or an increase of 2d. upon last year.

At the close of Alderman Fraser's speech, the Sheriff (Mr. S. Cook) said he thought that if, as the Chairman of the Finance Committee had said, the extent of the profits of the gas undertaking was not known and a surplus beyond the £27,000 which it was proposed to take would assist in the alleviation of the rates, they would not be doing their duty to the town if they sanctioned an additional rate when it might be avoided. He moved an amendment to the effect that the meeting should be adjourned until the following Monday, and if in the meantime they could ascertain from the accounts of the gas undertaking that they could appropriate £35,000, the additional £8000 would be equal to the proposed extra 2d. in the pound. If they could do this, it would be a source of great satisfaction to the town. Mr. Harlow said he should strongly oppose the amendment. A statement had been made by their Chancellor of the Exchequer which he thought ought to be replied to directly. After some remarks, the amendment was temporarily withdrawn to allow the Chairman of the Gas Committee to make his statement.

Mr. Harlow, who spoke with a certain amount of warmth, then proceeded to give his views on the gas agitation in the town. He said, with all deference to his friend, he was exceedingly sorry that he had felt constrained to take the step he had done in regard to the Gas Committee. The Committee had been working extremely hard to give satisfaction to the town; and in a short time there would be a report presented to show what they had done to meet the complaints that had been made. He thought the report would show that they had, at all events, done something. Yet they were now charged with another offence. When would these annoyances cease? When would they be free from this harassing and irritation? Alderman Fraser said he thought they would have a profit of £27,000 from the Gas Department. He (Mr. Harlow) went further. He said Alderman Fraser knew for certain he would receive this sum from the gas undertaking. There had been accounts made out of the work of the year—only rough, unaudited ones, he knew, but sufficient to show that a profit of far more than £27,000 had been made. At a meeting of the Finance Committee, he told the Chairman that they had made a profit of at least £5000 more than this. The probability was they had made £7000 or £8000 more, The statement had been made that the Council were blocked by the accounts of the Gas Committee not being ready for the budget, He would remind the Council that the gas undertaking was by far the largest in the city from a Corporation standpoint; and it took a long time to get out the figures of such an undertaking. They were being got out more quickly now than they had ever been before, for the reason that greater energy was being devoted in this direction. If the Council wished to have the gas accounts ready for the budget, let them close the year on Dec. 31. Not knowing what the figures of the gas undertaking would be, their Chancellor of the Exchequer proposed that the Council should make a larger rate to cover any shortcomings there might be in the profit. This was very bad finance. It was bad for the reason that it showed that if the rates were to be kept down, they had to bolster up the profits of their municipal undertakings; and they knew what this meant. The aim of the Corporation should be to supply good material for a good price. Many gentlemen present did not perhaps know what it took to realize that aim. They had not had to go through the three years' experience he had had. He was casting no reflection upon anyone present, but he said most emphatically that it was in consequence of the bad finance of the years past that they had the trouble of to-day. The gas undertaking had a capital of over a million sterling. Did they know what the reserve fund was? Because the fund was what it was, they had no one but the Finance Committees of the past to blame. Instead of the profits made by the Gas Committee being bled to the last farthing for the rates, it was only proper that a reasonable proportion of them should be placed to the reserve fund and written off for depreciation. Personally, he was extremely anxious that the extra profit that had been made should not go to the rates, but to reserve. He should like to see a sum of £10,000 carried to reserve and £5000 allowed for depreciation every year; and he hoped and trusted that no member of the Council would be so shortsighted as to say that they should take a further sum out of the Gas Committee's profits.

Alderman Fraser, in reply, said he thought he had some small cause of complaint against the Chairman of the Gas Committee. He did not see why, when he made a reasonable request for the figures and the total of the Gas Committee's operations, he should be met in the excited manner assumed by the Chairman of the Committee. Mr. Harlow seemed to think that his (Alderman Fraser's) object was to sweat the gas undertaking of every shilling he could get in aid of the rates. When he was introducing the resolution, he was careful to commend the electricity and tramways undertakings for building up strong reserves; and he would be the last man in the world to deprecate the building up of a strong reserve for the gas undertaking. If the full figures of the Gas Committee had been before them, he would be satisfied that £27,000 was as much as should be taken. There they had an undertaking with practically £1,250,000 of capital; yet its statement of affairs was not yet forthcoming. He did not wish to misrepresent Mr. Harlow, but he rather understood him, towards the end of his speech, by what he feared was a little slip on his part, to admit that the account was being kept back lest he (Alderman Fraser) should lay his hands on more than he was entitled to. He submitted that this was very bad finance. They ought to have the statement before them, so that the Council could judge what should be placed to the reserve and what should go in aid of the rates. He objected to this result being arrived at while an account was being kept back. It might be that the gas account required increasing; but let them do it in a businesslike and methodical manner. Mr. Harlow said he was weary of the complaints about the gas. But he (Alderman Fraser) could assure him and his Committee that until there was a real reform in the management of the gas undertaking there would never be an end to the complaints. He had nothing to do with the complaints as to the general management; but he begged of Mr. Harlow, considering the amount of capital he had, to take care that another year the entire figures, whether good or ill, were ready. With regard to the amendment that had been proposed, he did not think a delay of a week would enable the lethargic Gas Committee to bring up their figures; and consequently he suggested that the amendment should be withdrawn and the proceedings closed. The Sheriff might take it for granted that the actual figures of the gas undertaking, when finally compiled, would not escape investigation.

The amendment was withdrawn, and the formal resolution to adopt the report of the Finance Committee was read and carried.

GAS PROFITS AND THE RATES AT DARWEN.

Mr. Duxbury's Protest.

In the "JOURNAL" last week (p. 458), we noticed briefly the action taken by Councillor Duxbury, of Darwen, with the view of putting a stop to the appropriation of the gas profits in relief of the rates. He brought forward a resolution in the following terms: "That the automatic transfer of gas profits to the general district fund for the relief of rates, passed by the Council at its meeting held on the 4th day of June, 1903, forthwith cease, and that the last clause of the resolution—viz., the words 'on attaining this reserve the profits of the gas-works shall automatically go to the relief of the rates'—be struck out and rescinded." Mr. Duxbury was unsuccessful in carrying his resolution; but, in view of his former connection with the gas-works, it may be of interest to indicate the nature of the arguments he used in support of it, as well as those of his opponents.

Mr. DUXBURY began by quoting the text of the Council's resolution dated June 4, 1903, as follows: "That, after allocating out of the gas profits the sum of £500, in reduction of the adverse balance on the district rate account, no further money shall be taken from the gas profits till the reserve fund stands at £5000. On attaining this reserve, the profits of the gas-works shall automatically go to the relief of the rates." He then said: This resolution, passed three years ago, is about the worst possible form of dealing with matters financial that could be adopted by any town council. In the first place, it binds all future members of the Council so long as it stands, which is wrong in principle; and, in the second place, it instructs the Borough Treasurer to transfer quietly, automatically, and without further notice, all profits which may hereafter be made, and that without any attention being drawn to it, or any special resolution of the Committee. This is an insidious method of perpetrating one of the greatest wrongs and injustices against one section of the ratepayers in favour of another section, in order to cover up the extravagance of some other spending department; and I venture to suggest that there are even members of the Council, let alone ratepayers, who are not cognizant of its working, or of the amounts so stealthily dealt with. It may be argued that Manchester and Blackpool, and several other towns, transfer gas profits to rates; and unfortunately I happen to be a gas consumer in both the towns named, as well as in Darwen. Manchester is certainly one of the most hardened sinners in this respect, and there is no doubt that this leads to extravagance in the markets, baths, and other departments. But the Chairman of the Gas Committee, who has more experience and knowledge on this matter than all the others put together, stated that "for years he had held the opinion that it was wrong in principle to subsidize the rates out of the profits of the gas undertaking; and he moved—"That, in the opinion of this Council, the present system of subsidizing

the rates out of the profits of the gas undertaking is wrong in principle, unjust in practice, inimical to the best interests of the ratepayers, and ought to be discontinued." This is the opinion of Alderman Gibson, of Manchester, the Chairman of one of the largest gas undertakings in the country, who has had a lifelong experience of the subject. His arguments were that it is wrong to make any one portion of the community bear more than its fair share of the public burden, that every tub should stand on its own bottom, and that the proper principle is to make every department of the Corporation responsible for its own acts and expenditure. Then again he said: "It is a monstrous robbery to take these hundreds of pounds annually out of the pockets of the poor gas consumers and put the money into the pockets of large ratepayers, who are rich, and who do not use gas; and this claptrap phrase of 'relieving the ratepayers' is utterly at variance with the truth, and utterly fallacious. Even George Bernard Shaw, in his little book on "The Common Sense of Municipal Trading," says: "The object of municipal trading is not relief of the rates; if it were, it might be manipulated so as to throw the whole burden of local taxation on certain classes of consumers. . . . Its object is to provide public services at cost price." In 1902, the Darwen Gas-Works made a loss of £3800; but still you transferred £1000 from the gas "profits," and raised the price 3d. per 1000 cubic feet in order to make up the amount—a most unwarrantable proceeding for any Council to take, in my opinion. Since then your net profits from gas have been £8659; but you have not reduced the price. In 1903, you took £500; in 1904, £966; and last year (1905), £1547. The two latter sums were taken without coming before the Council or the ratepayers for discussion in any way. I have only heard three reasons why gas profits should go to the rates, and these are: (1) Because the gas-works belong to the ratepayers, who have to bear all the risks and responsibilities of them. (2) Because money can be borrowed cheaper through the gas-works being owned by the Corporation. (3) Because it enables them to spend lavishly and extravagantly in any other department, without having to deal with the Local Government Board and without raising the rates. It is the old principle of "Come easy, go easy;" and the tendency of other departments is to increase their expenditure when they can rely on large sums being handed over to them by indirect taxation—by a stroke of the pen, or the casting of a vote—instead of having the money to find by direct levy. There is some human nature in this. Now as to the responsibility of the ratepayers for the gas-works. Where is the risk? Can anyone point to a single case in the country where the ratepayers, instead of the gas consumers, have had to pay? Take our own case. In 1872, when the Gas Company were bought out, the total expenditure on capital account was £47,394. Since then the gas consumers have not only paid all the costs of making and distributing gas, but have also made profits amounting to a total of £285,000. These consumers have paid all your interest and annuities, amounting to £160,000. And they have further paid to you £81,000 in redemption of the debt on the gas-works; and this money, with compound interest, you have in your possession to-day in one form or another. You have taken out of the pockets of these gas consumers no less than £37,300 for rates and other purposes, and besides this a further £5000 which you have now as cash in hand. All this has come from the gas consumers, and the ratepayers have not paid a single penny. This is the ratepayers' risk, that some people talk about. Now, 1d. in the pound on the general district rate is £550; so that £1547 taken last year equals about a 3d. rate. If all ratepayers were gas consumers, and the consumption and rate assessment bore the same relative proportion to each other, then such transfer would make no difference. But this is not so. I have taken out a few cases as follows: Since the price of gas was raised 3d. per 1000 cubic feet, every church, chapel, and school using gas has paid this 3d. per 1000 feet towards reducing other people's rates; and as places of worship do not pay any rates, they get nothing returned. Take twelve shops using electricity and a little gas. The 3d. per 1000 feet increases the cost to them by £9 11s.; but they saved in rates, at 3d. in the pound, last year £5 4s. So that £4 7s. came out of other shopkeepers who use all gas. This is not voluntary. The Corporation compel the latter shopkeepers to pay equal in rates and 7s. 6d. each more for gas, and the first shopkeepers each receive from the Corporation 7s. 6d. which has been taken unjustly out of the pockets of their neighbours. Now take twelve workshops using gas-engines. The 3d. per 1000 cubic feet increase costs them £39 17s.; but as their assessments were only £501, their rates were only reduced by £6 5s. 4d. These small gas-engine people, therefore, have been compelled by the Council to pay £33 11s. 8d., or £2 16s. per annum each, towards other people's rates, besides paying their own rates in full. Imagine these struggling gas-engine users going every Christmas Day to the Darwen Paper Company or to the Wall Papers Combine and saying: "Here is £2 16s. towards your rates"! I venture to suggest that neither of the large firms mentioned would thank you for it, and would rather be without it. Take four cases: A paid 4s. 7d. extra for gas and saved in rates £5 9s. 2d.; B paid £16 extra for gas and saved in rates £65 5s. 5d.; C paid £5 8s. 2d. extra for gas and saved in rates £24 5s. 5d.; D paid 18s. 3d. extra for gas and saved in rates £5 6s. 2d. Total paid, £22 11s.; total saved, £100 6s. 2d. I could multiply the cases of injustice, but I will only give one more. There are in Darwen 5836 cottages using gas which are rated at less than £8, and here the landlord pays the rates. These cottages will each use on an average 9000 cubic feet of gas per year. All these poor people, therefore, pay 2s. 3d. annually, which amounts to £656, and this goes into the pockets of their landlords in reduced rates, and the landlords do not contribute a penny towards the £656 in respect of their property. Further, these landlords do not all live and spend their money in Darwen. About 150 are absentees, who take away this 3d. reduction on their rates to spend elsewhere; and it probably helps to pay their rates in full in some other town, where the council are not so foolish as in Darwen in regard to the gas profits. Besides this, there are upwards of 600 houses in Darwen where no gas is used; and these also get their share of the gas profits. I have shown you the iniquity and injustice of these transfers of gas profits; and I have shown you that the ratepayers have no risks to compensate. There only remains the argument that the ratepayers deserve something from the gas consumers, because they can borrow money cheaper by mortgaging the whole town as security. I consider that the gas consumer more than compensates the ratepayer for this little advantage in borrowing money at a shade less interest, in redeeming the whole debt upon the works by annually paying an increased price for his gas by way of a sinking fund, and thus making a present to the ratepayers in thirty to forty years' time of gas-works free from debt and in first-class condition. The Darwen gas consumers have paid into your sinking funds £81,000. The very fact of making these profits and contributions to rates causes an additional burden on the gas consumers, seeing that the assessment of the gas-works is increased and the income-tax is heavier by reason of these excess profits. As a rule, gas consumers are hoodwinked or kept ignorant on this subject; and I feel sure that in many towns this policy would cease if they were fully informed of the issues. It is the poorer people who suffer; and as gas is still the best and cheapest poor man's light, you are taxing him unequally. Supposing the recent Budget of the Chancellor of the Exchequer had contained a new impost of 3d. per 1000 cubic feet on all gas consumers in the country, what a hubbub this would have caused. Time was when a section of the people hold up their hands in horror because of a great agitation against the taxation of daylight. But what statesman would dare attempt to reimpose the old window-tax? I am hoping that the time is near when we shall look back with as much horror and disgust at the gas-tax as we do now at the window-tax. Seeing that the gas-works can make a profit, you will naturally ask what I propose to do with it. I do not propose to reduce the price at present. Times are good, everyone is in full work; but the rainy day will come again. The capital of the gas-works is far too high. It is over £10 per ton of coal carbonized, or 22s. per 1000 cubic feet of gas sold; whereas the average of other towns is about £6 per ton and 12s. per 1000 cubic feet sold. While times are good, I should reduce this capital as much as possible. We are now paying £10,308 per annum in interest and sinking fund; and every £1000 off the capital means £60 less to pay annually. Though gas is far ahead of electricity to-day, we do not know what may come; and we ought to put ourselves in the position of supplying at the lowest possible price, as efforts in this direction will be more appreciated now than when they are made under the compulsion of a life-and-death struggle for existence.

Mr. JEPSON having seconded the motion, which was supported by Mr. DUCKWORTH,

Alderman TOMLINSON said there had been absolutely no new thing given to them that day to induce him to change the views he had held since he became a member of the Council. During the time Mr. Duxbury was associated with the Gas Department as Manager, the question was discussed on many occasions; and he had not presented to them one new feature that was not brought forward at that time. He had not given them a single town that followed the practice suggested, but had looked at the matter entirely from the standpoint of a gas manager, and not from that of a member of a municipal body. It was stated that each department should stand on its own bottom. What about the expenditure? This could not do so. If the income from the working of a certain department was not sufficient, it must necessarily be made good out of the rates. If they were to be encumbered by these non-paying concerns, was the ratepayer not entitled to say something? All moneys borrowed were obtained at the risk of the ratepayers, who, therefore, were justified in looking forward to reasonable recompense for the risk they took. It would not do to say that because a man did not go into the park he ought not to contribute towards its upkeep. It would all end in chaos. Whatever might be done from now till 1912 mattered little to the rates, because £1000 a year had to come out of the profits until the £5000 was made up to pay for the installation of the new stoking-machines. Until this sum had been built up, it was not likely to be of much good to the ratepayers. The whole thing came before all the Chairmen of the Committees; and there was no reason why they should cancel the resolution of 1903.

Alderman ECCLES remarked that some time ago the capital value of the gas-works in Darwen was less than it was in Blackburn. From figures he had seen that day, they were in a considerably worse position than Blackburn. Mr. Duxbury did not understand that the appropriation for the new stoking machinery had to be taken out of the profits, and not out of the capital charges.

Alderman CARUS said Mr. Duxbury might postpone the matter for another year, and then move "That the profits made from the gas-works, if any, be appropriated by the Council annually to the reduction of the rates or the reduction of the gas capital, as they think fit."

Mr. DUXBURY, in reply, said in nearly two-thirds of the towns in this country there were gas companies, and not gas-supplying local authorities. The electrical people were getting their share of something they did not use. Why make one man pay double and the other single? By making such a statement, it was another way of throwing the dust in the eyes of the ratepayers. The idea was simply a myth. They ought to bring the capital charges down to a reasonable figure, and then they could talk about what they could do afterwards. Alderman Tomlinson had said the decision had not been come to secretly. He (Mr. Duxbury) had asked many members of the Council, and they did not know, while others had forgotten, that the resolution was passed in 1903. Alderman Carus had very ingeniously worded the suggested resolution; but he (Mr. Duxbury) objected to the profits going to the rates, and he would oppose it.

The MAYOR (Mr. T. P. Davies) said the question was a very important one, and members had gone away who had advocated the same thing as Mr. Duxbury. He felt they ought to consider the matter very carefully.

A vote was then taken, when the motion was lost by 11 votes to 4.

Between eight and nine o'clock on the night of Saturday, the 12th inst., when the town of Pontypridd was at its busiest, the electric light failed. The result was that there was a stampede to the gas-meters, and the town resumed its old appearance. The business premises in which the gas supply had been cut off were in darkness for some minutes.

INCANDESCENT GAS LIGHTING IN LONDON SCHOOLS.

At the Meeting of the London County Council last Tuesday, Mr. Cyril Cobb, speaking on a recommendation of the Finance Committee for sanctioning £552 on the education account for gas-fittings in schools, said he understood that the policy of the Council was to introduce incandescent gas-lights where the old-fashioned burners were worn out. If the sum now required was for repairing these burners, he thought it was rather a waste of money; and if it was for repairing new lights which had been put in within the last three or four years, the work must have been rather badly done. Further items of expenditure on gas-fittings would come before the Council, and he wished the Chairman of the Finance Committee to give him more information on the subject. Lord Welby replied that, as he had informed Mr. Cobb on a previous occasion, the matter was receiving the attention of the Education Committee. The recommendation was approved.

The Education Committee recommended that an expenditure of £1108 be sanctioned for the purpose of providing incandescent gas-lighting at thirteen of the Council's schools. They reported that they were making inquiries into the general question of gas lighting in schools. Mr. Cobb, in moving the reference back of the recommendation, said that in the report of the Committee they stated that they were making inquiries into the general question, with the view of ascertaining whether the present practice was alike the most effective and economical. At this time of the year, there was little use for gas; and therefore there was no hurry for the work proposed to be done in the schools referred to until they had received the information from the Committee to which allusion had been made. Mr. A. J. Shepheard (the Chairman of the Committee) said the work was pressing; and he hoped the matter would not be referred back. At the meeting of the Committee, they had a long discussion on the matter; and he thought Mr. Cobb had been satisfied with the answers he had there received, and which had been repeated in the Council. The recommendation was carried; only 10 voting in favour of the reference back.

PRICE OF GAS FOR POWER AT HUDDERSFIELD.

There having been some criticism of the recent decision at Huddersfield to reduce the price of gas used for power and business purposes to 1s. 6d. per 1000 cubic feet, a statement has been published by the Chairman and Deputy-Chairman on behalf of the Gas Committee of the considerations which induced them to adopt this course. The following are the principal points urged.

It had been ascertained that suction-gas plants which were capable of making a cheaper gas for power purposes had been extensively introduced in several towns; and orders for the same were being eagerly canvassed for in Huddersfield. It was apparent to the Committee that something must be done to protect the financial interests of the Gas Department, as had similarly to be done in Birmingham, Burton, Nottingham, Sheffield, Stockport, Lancaster, Leicester, Rochdale, and many other places, where the price of gas had been reduced for motive power purposes to 1s. 6d. per 1000 cubic feet (and under), at which figure it could compete with its rival suction gas. The Gas Department could not remain inactive in the face of this wholesale competition. While the statement is correct that twelve months ago the cost of gas made was 1s. 11½d. per 1000 cubic feet—this cost including capital charges, sinking fund, &c., amounting to about 8d. per 1000 feet, which must be paid whatever quantity of gas be consumed—the cost of manufacture has now been considerably reduced. The supply of gas being for power and business purposes during the daytime enables a larger portion of the plant at the works to be used continuously, and further utilizes the gas-mains and service-pipes throughout the district, which otherwise would be unemployed at that time. Such economy in working is fully understood and appreciated by all electric undertakings throughout the country, who willingly make a reduction of from 70 to 80 per cent. for motive power and business purposes. No word of objection is ever raised to such a common-sense proceeding. It is an undoubted fact that if all the gas consumers used gas for domestic purposes only, it could not be sold to them at its present prices, as will readily be seen when it is remembered that to sell the same quantity of gas now sold, more than twice the present number of consumers would be necessary, entailing double costs for services, meters, stoves, salaries, distribution, capital charges, &c. It is quite evident that it is the large consumer who makes it possible for the small consumer to have his gas at the present low rates. This is only the case, however, with regard to consumers for motive power and other trade purposes, and not as regards lighting. A large lighting consumer makes a heavy demand for a few weeks of the year only, requiring the provision of plant which would have to remain unused during the greater part of the year if it were not for the power users. Every endeavour should, therefore, be made to encourage the use of gas which will increase the day load.

In order to extend the use of gas among the smaller consumers, the Committee have introduced the prepayment system. In many towns an extra 6d. to 1s. per 1000 feet is charged for gas supplied through these meters to pay for the extra cost of the meter, cooker, and collection; whereas in Huddersfield this additional charge has not been made. On Jan. 1 last, the prices for ordinary lighting and prepayment meter consumers were reduced 3d. per 1000 feet; and for stoves, &c., 2d. It is the anticipation of the Committee, by reducing the price of gas to 1s. 6d. for motive power, &c., that the prices to the ordinary and prepayment consumers may be further reduced in the near future. The trade and business of the town are of paramount importance; and the reduction has been made to suit all business concerns, whether upon a large or upon a small scale. The development of the trade of the town has been seriously retarded by the high price of gas for business purposes. Of this the Gas Committee were convinced; and they have, therefore, endeavoured to abolish this hindrance to the welfare of the community. It will be admitted that the Gas Committee duly elected by the Council must be accredited with a fuller knowledge of the matters appertaining to the department than outsiders can be.

CHILDREN'S COOKERY COMPETITIONS AT WAKEFIELD.

Last Thursday, an interesting experiment which had been in progress for some days at Wakefield was brought to a successful close. The Gas Company have lately been holding an exhibition at the Corn Exchange, at which an excellent display of lighting and cooking appliances was made by well-known firms, as well as by the Company, under the supervision of Mr. Harry Townsend, the Manager. It was opened on the 7th inst. by the Chairman of the Education Committee of the Corporation (Alderman Smith, J.P.), in the presence of a goodly gathering, who were welcomed by Dr. Statter, the Chairman of the Company. A special feature of the exhibition was a series of cookery competitions for children; and in the course of his remarks, Dr. Statter explained how they came to be introduced. He mentioned that when they were considering the question of an exhibition, Mr. Townsend conceived the happy idea of combining business with philanthropy, saying, "Let's give the children a turn." This idea naturally led them to the Education Committee, and they were then brought into contact with Alderman Smith. They sought to obtain his co-operation and assistance, and they were not disappointed, for he took up the subject with his usual patriotic and public zeal, and did all he possibly could to bring the exhibition to a happy consummation. Fifteen schools would take part in the competitions. A shield would be awarded to the winning school, and when won three times (not necessarily in succession) would become the property of the school, and would form a pleasing memento of the competitions. Laundry competitions had also been arranged; and the prizes would be distributed by Mrs. Statter, who knew a great deal more about cookery, &c., than he did. Dr. Statter then went on to refer to the value of gas for culinary operations, and concluded by asking Alderman Smith to declare the exhibition open.

In complying with the request, Alderman Smith said that from a long experience of the use of a gas-cooker in his own house, he could testify to the efficiency and convenience of this method of using gas for domestic purposes; while his wife authorized him to say that she considered a gas-cooker to be an indispensable part of the household arrangements. When the Manager of the Gas Company approached him in regard to the competitions, he was at once impressed by the novelty and utility of the proposals, and promised his hearty co operation. He felt quite sure that the competitions would be the means of creating a more active interest in two important subjects of domestic economy—cookery and laundry work. It was a matter for great satisfaction that these branches of women's education were being treated more and more as essentials at the elementary and secondary schools.

In connection with the exhibition, Miss S. Barker gave lectures each afternoon on high-class and household cookery. Every evening three girls from each of the Wakefield elementary schools gave practical demonstrations of the effective teaching they received at the School of Cookery. It was arranged that twelve certificates should be awarded at the close of the competitions; and the school team showing the highest proficiency was to be awarded the handsome silver shield offered by the Gas Company. Five certificates were to be given for laundry work, done in open competition. The distribution of prizes took place last Thursday evening, when Mrs. Statter, in accordance with the promise made by Dr. Statter, handed the awards to the successful competitors. The winners of the shield were the three scholars from the Thornes Lane School—Ada Dunnill, Florence Wilson, and Nellie Wright. Archdeacon Donne proposed a vote of thanks to Mrs. Statter. He said he felt sure the exhibition would prove to have been of value, and it was a happy idea of Mr. Townsend's to suggest the cookery competitions for the children. The importance of good cooking could not be overrated; and the manner in which the girls had acquitted themselves reflected great credit upon their teachers. The vote was heartily accorded.

Melbourne Gas Company and Electric Light Charges.

At the last Meeting of the Melbourne Gas Company, the Chairman referred incidentally to the litigation then in progress between the Company and the Corporation on the subject of the legality of the maximum demand tariff of the Electric Light Department. The Company set in motion the Attorney-General, with the result that the Victorian Courts decided that differential charging for electricity under the Wright system was illegal; and an injunction was granted against the Corporation. An appeal was made by them to the Federal High Court; and we learn from the "Electrician" that the decision has been reversed. In giving judgment, the Chief Justice said that, though the wording of the Act allowed of two interpretations, he considered the evident intention was that all customers should be placed on an equal footing and have equal privileges, without preference being shown to particular individuals, and not that absolutely the same charge must be made to every customer irrespective of the conditions under which he took a supply. Consequently, the Corporation differential tariff, offered equally to all customers, was in no way contrary to the Act.

Tiverton Gas-Works Profit.—A discussion took place at the meeting of the Tiverton Town Council yesterday week on the subject of the disposal of the profit of £613 on the past year's working of the gas undertaking. Mr. Heathcote-Amory moved that £265 of the profit be added to the reserve fund, bringing it up to £2500, and that the balance of £348 be devoted to the relief of the rates. Alderman J. Thorne, in supporting the proposal, said that a great deal of ignorance existed with regard to the gas-works; and this would show those who were opposed to the undertaking that they could make a profit. Mr. J. Grater proposed, as an amendment, that the balance be placed to a suspense account until the Lighting Committee were prepared to report as to its disposal; his idea being that the consumers should have the benefit of the surplus. Several speakers thought that the consumers deserved first consideration; and the motion was withdrawn, and the amendment carried.

MONTE VIDEO GAS COMPANY, LIMITED.

The Directors of this Company, in the report which they will present to the proprietors at the annual general meeting on Thursday, state that the accounts for the year ending Dec. 31 last show a profit of £24,530, which has been passed to the credit of profit and loss. Adding interest and discount, profit on exchange, Directors' fees waived, and the balance brought forward (£10,139), the total is £36,584. After providing for interest on debenture stock, debentures, income-tax, bad and doubtful debts, and depreciation, and reserving £500 for renewals, &c., the balance available for distribution is £29,654. An interim dividend was paid on the 18th of November, in respect of the half year ended June 30, of 6s. per share, less income-tax; and the Board now recommend the payment of a further amount of 8s. per share, also less income-tax; making together a dividend of 3½ per cent. for the year. This will absorb £18,967, and leave £10,687 to be carried forward. The balance at the credit of the reserve account is £23,760; the contingency account stands at £16,520; and the insurance fund remains at £12,500. Owing to a decision recently given by the Courts, that companies cannot hold and re-issue their own debenture stock, the Board have cancelled an amount of £1560, being the nominal value of 78 debentures of £20 which were bought slightly below par, and afterwards exchanged into debenture stock. Of the £58,080 of debentures issued in 1892, £50,240 has been paid off at par, in accordance with the endorsement on the bonds; and the balance of £7840 has been exchanged for an equivalent amount of debenture stock. The Board report with satisfaction that the reduction in the price of gas which took effect from April 1, 1905, has resulted in a substantial increase in the quantity of gas sold and in the number of meters fixed. The revenue from the Dock Department shows a decrease, as was expected; the figures for 1904 being the highest on record. One of the causes contributing to this decrease in revenue was the general strike of mechanics in Monte Video, the effects of which were felt for some time. The Directors state that the Company's plant and property have been maintained in a state of efficiency.

FATALITY AT THE HAGGERSTON GAS-WORKS.

Last Wednesday morning, a serious accident, unfortunately attended by loss of life, happened at the old Haggerston works of the Gaslight and Coke Company in Laburnum Street, Kingsland Road. This station was closed in March, 1900, and the work of taking down the buildings, prior to the site being offered for sale, was let to a firm of contractors at Stratford. It appears that while work was in progress on the retort-house, the roof of which had been partly dismantled, leaving only the iron principals, an attempt was made to raise a pole to be used as a derrick, tackle was made fast to one of the principals, and the pole was being raised, when the ironwork was seen to be moving. An alarm was given, but before the workmen could all reach a place of safety the roof collapsed and fell, followed by a shower of bricks. After the terrified men had recovered from the shock, a search revealed the fact that four of the gang had been more or less seriously injured. They were all taken to the Metropolitan Hospital, where one—James Sweeney, 27 years of age—subsequently died; his case having from the first been hopeless. Another, named John Wilson, whose back and arm were injured, was detained; but the remaining two were allowed to go home.

BIRMINGHAM GAS-FITTERS AND THE GAS DEPARTMENT.

The Birmingham and District Master Gas-Fitters' Association have addressed to the citizens and ratepayers a circular-letter, copies of which on a large scale have been posted throughout the city, while smaller ones are exhibited by the gas-fitters in their establishments. The circular asks if it is a fact that secret commissions have been paid to some of the employees, one of whom was discharged, and that the matter was not brought before the City Council; that the Corporation are employing youths to do skilled work at 15s. per week; that the Sheffield Gas Company can supply gas to the householder at 1s. 5d. per 1000 cubic feet and pay 10 per cent. dividend, whereas the Corporation of Birmingham charge the householder 2s. 6d.; and that the Gas Department supply their workpeople with American-made tools, and use American and Continental tubes and fittings, to the detriment of the Birmingham manufacturers. The circular asks the public to support their own ratepayers, who have this unfair competition to fight against, and adds that the appeal is made "for the purpose of obtaining the ratepayers' assistance in compelling the Gas Department to give up this unjust trading and shopkeeping against a section of the ratepayers, which, if successful, will give the Gas Committee greater opportunities of devoting time and attention to cheapening the production of gas, and thereby reducing the rates."

In the course of an interview with the representative of one of the local papers on the subjects dealt with in the posters and circular, the Secretary of the Gas Department (Mr. G. Hampton Barber) said it was a fact that during the last 28 years one employee had been found to have accepted a commission from a firm of manufacturers on orders issued by the Corporation. The man was discharged, and the account of the Gas Department with the offending firm closed. The matter was not brought before the City Council, because it was merely a question of administration. As to the allegation of employing unskilled youths, Mr. Barber stated that a limited number of apprentices trained in the service of the department, and nearing the completion of their time, who were known to be very capable workmen, had, under the supervision of a carefully selected skilled gas-fitter, been allowed to fix meters and fittings in small tenements. As to the use of American tools, he admitted that a few American tools, better adapted to the use of the department than British-made tools, were used by the fitters; but the average annual cost would not be more than £50. The Committee, so far as he was aware, were not purchasing American or Continental tubes; but malleable iron pipe fittings, possibly of Continental make, were purchased from London merchants at about half the cost of similar articles of British manufacture, simply because they were better fitted for the work. The outlay in this direction would not be more than £350 per annum. Thus the amount spent on foreign goods in a department with a turnover of nearly £1,000,000 would not exceed £400.

GLAMORGAN AND SOUTH WALES WATER BILL.

The London County Council and the Bill.

At the Meeting of the London County Council last Tuesday, the Parliamentary Committee presented the following report on the position of the Council in regard to the above-named Bill.

The Council on Feb. 20, 1906, approved our action in presenting a petition, under the seal of the Council, against the Glamorgan and South Wales Water Bill, which proposed to empower the Glamorgan County Council to make inquiries and surveys with a view to utilizing the water supplies in South Wales and to constitute water districts and Water Committees for such districts. The Bill came before a Committee of the House of Lords, presided over by Lord Newton, on the 7th of May. Several modifications had been made in the Bill as presented to the Committee; the proposed power for the South Wales County Councils to form a Joint Water Committee being omitted, and the power for the Glamorgan County Council to create water districts and Water Committees being limited to the county of Glamorgan.

It was stated on behalf of the promoters that the proposals in the Bill were necessary, owing to the greatly increasing population of Glamorganshire, and the difficulty of securing a supply of water for that population due to the coal-mining operations. The Glamorgan Council therefore desired to be allowed to make inquiries as to possible sources of supply, and then to form a combination of Local Authorities who would come to Parliament to be allowed to make use of the best source so discovered. These matters the Glamorgan Council considered to be purely of a domestic nature, and they accordingly objected to the *locus standi* of the London County Council.

The Council contended that they had an absolute right to be heard under Standing Order 105 D of the House of Lords, which provides that any county council alleging in their petition that their county may be injuriously affected by any Bill relating to the water supply of any town or district, whether within or without such county, shall be entitled to be heard against the Bill; and, alternatively, that the case was one in which the Council should be given a discretionary *locus* to appear under Standing Order 105 C. In the result, the Chairman stated that the *locus standi* of the Council should not be granted; and that of the Metropolitan Water Board was also subsequently disallowed. The Bill was passed by the Committee, subject to the following conditions: (*a*) That it should be made clear that entry on land for the purposes of the Bill is not to be made without the consent of the owner or occupier; (*b*) that a clause should be inserted showing that the Bill gives no preferential right to water on land that has been surveyed; (*c*) that the power to create Water Committees should be omitted from the Bill. The Committee also expressed a strong opinion that if the Glamorgan County Council applied to Parliament for further powers with reference to acquiring a water supply the Bill should be promoted, if possible, in conjunction with the adjoining districts.

Public Lighting in Bermondsey.

The Bermondsey Borough Council last Tuesday considered a report (adjourned from the previous meeting) by the Borough Surveyor on the gas street lighting of the borough—*ante*, p. 386. The lighting and maintenance of the lamps in the Bermondsey parish are under the control of the Council; and the gas is supplied by meter. In the district of St. Olave's, it is charged for by the Gas Company at a rate per lamp which varies in accordance with the description of burner and the current price of gas; the lamps being lighted and maintained generally by the Council. In the parish of Rotherhithe, the lamps are charged upon a rate which varies in accordance with the description of burner and the current price of gas; but the latter includes gas and maintenance by the South Metropolitan Gas Company. The rates for St. Olave's and Rotherhithe, including gas and maintenance, are generally higher than those for Bermondsey. The Street Lighting Committee recommended that the whole borough should be brought on to a uniform basis; thereby effecting a net saving of £142 on the first year, and a net annual saving of £282 afterwards. The Council adopted the following resolutions: (1) "That the whole of the lighting be taken over from the Gas Company in St. Olave's and Rotherhithe, from June 24 next." (2) "That the lamps be put on meter in the ratio of 1 to 20, which shall be supplied by the Borough Council." (3) "That in future the whole of the borough be placed upon the same basis as the Bermondsey district."

Reductions in Price.—The Directors of the Slaithwaite Gas Company have reduced the price of gas from 3s. 6d. to 3s. 4d. per 1000 cubic feet for lighting and to 2s. 10d. for cooking and power purposes. The Crediton Gas Company have reduced their price from 4s. 6d. to 4s. 4d. per 1000 cubic feet.

Portsmouth Water Company.—The shareholders of this Company are to hold their half-yearly meeting on Thursday, when the Directors will report a balance of £31,053 available for distribution, out of which they will recommend the payment of the full statutory dividend. After making deductions for void houses, &c., there will be left a sum of £12,609 to be carried forward. The Directors refer to the proceedings upon the Company's Bill in Parliament (reported in our "Parliamentary Intelligence"), and to the negotiations entered into with the Portsmouth Corporation for the acquisition by the latter of the Company's undertaking; and they announce their intention of convening a special meeting at which the terms of purchase will be explained.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I learn with great regret that Mr. James M'Gilchrist, of Dumbarton, passed away at ten o'clock last night. By his death the most picturesque figure among gas managers in Scotland has been removed. His was a commanding presence. There was a shade of the masterful in his manner—the outcome of the great spirit of large-heartedness which he bore, enforced by the firm convictions he held, and emphasized by an unbounded and fascinating geniality. He was a self-made man. I have heard it said that he began life in a blacksmith's shop, and raised himself, by study and assiduity, to the position of Engineer. When he secured the post of Gas Manager at Dumbarton, he chanced upon a position which he was more than capable for. Had he been, either then or afterwards, appointed to manage the gas-works in a larger place, where his energies would have been more severely taxed, there is every reason to believe that he would have made a name for himself for work of a more concentrated, but certainly not more conspicuous, nature than that which it fell to his lot to do. But, as it was, having abundance of leisure, he developed the profession of Consulting Engineer, and so promoted it that it may be said that latterly he held almost every appointment of the kind in his hand. If I were to attempt to give a list of the gas-works which he had a hand in modernizing, I should be certain to leave out some; so I had better refrain—contenting myself with mentioning the more recent ones of Newport, North Berwick, and Gourock. The works in these places were all built to his designs, and are models of works adapted to the necessities of the localities. It was a feature of his engineering which could not miss observation that he had no grandiloquent ideas, leading his patrons into needless expense, nor predilections as to types of plant, which would have narrowed his powers and destroyed the efficacy of his advice. He applied himself to the needs of the district and the local conditions. He was able to take up this position by the comprehensive nature of his knowledge of the industry. He was not merely an engineer, but a sound commercial man as well. Keeping himself in touch with the movements of the markets—for he was almost invariably to be found in Glasgow on a Wednesday, his proximity to the great commercial centre of Scotland giving him this privilege—he gained an acquaintance with the laws of supply and demand which few possessed. This gave a weight to his advice upon the financial side, as his engineering knowledge gave to his advice upon the practical side, of the gas profession, which ensured the success that it is pleasing to note attended all his endeavours. Quite a number of gas transfers were carried through in Scotland upon his advice, without any reference to arbitration; and all have turned out to have been well considered and well applied schemes, for both of the parties interested. A many-sided man, he led a strenuous life, not confining himself to the exercise of his profession, but taking his part in politics, in volunteering, and in other movements of a public nature. We know the abiding interest he took in the public affairs of the gas industry, his constancy in attendance at meetings of gas managers, and his frequent contributions to the transactions of such meetings, both oral and otherwise. And, of course, his labours in connection with the Informal Meeting of Scottish Gas Managers must not be overlooked here. He made that meeting, and lived to see it a great success. In Dumbarton, he managed the gas undertaking according to his own ideas, and managed it with so much skill that there never was a questioning word as to anything that he did or proposed. To use a phrase which is common at the present day, he was a "valuable asset" to the burgh. He was consulted on all subjects, and on every occasion his advice was on the side of caution. Though a Liberal in politics, his influence, in all walks of life, was against changes which he considered unnecessary; his faith being more in the old and tried than in the new and untried. It is safe to say that few men of his class will be more missed, in more quarters than one.

The Corporation of Grangemouth took over the undertaking of the Grangemouth Gas Company at twelve o'clock noon on Wednesday, and paid the price agreed upon—£28,500. This was the last transfer effected by Mr. M'Gilchrist. Truly, there is a touch of melancholy in the fact that the Town Council on Monday formally remitted two subjects to him for his report. The Town Council, at the same meeting, resolved to appoint the Town Clerk and the Burgh Chamberlain to be Clerk and Collector respectively to the undertaking *ad interim*, and to continue Mr. C. Winton as Manager *ad interim*; also that the Clerk write to other burghs of similar size to obtain information as to the duties and emoluments of the officials.

The Scottish Junior Gas Association—Eastern District—closed their second session this afternoon by a quarterly meeting in the Heriot-Watt College, Edinburgh. Unfortunately, a furious storm of wind and rain raged all day, which greatly restricted the attendance. One paper was read at the meeting, by Mr. W. Williamson, of Leven, and another one having been withdrawn, the Council came to the rescue with a series of five questions upon subjects of general interest. Mr. Williamson gave his experiences with prepayment meters; and both this and all the other subjects before the meeting were dealt with in a chatty manner. There was nothing of great depth or point brought forward; but there was a free interchange of practical, profitable views upon subjects which touch all who manufacture or distribute gas. The Association have finished a session which has been in every way creditable to them. They have reason to be satisfied with the amount of information upon concrete subjects which they have been able to bring out. Matters are flourishing with them; and while that is so, we can only wish them God-speed, and express the hope that this happy state of matters may continue. There is plenty of talent in the Association, and abundance of subjects are still untouched; so that there is every reason to expect as good business as we have yet got.

Sheriff-Substitute Thomson, at Hamilton, in disposing of the action by Mr. J. Turner against the Bothwell and Uddingston Gas Company (the proceedings in which will be found on p. 524), has rendered a service to those who supply gas. It was scarcely to be anticipated that he would, or could, decide the case otherwise than in favour of the Company; but there was a possibility that he might. If he had, the consequences would have been serious. It was an ingenious contention which was set up, to the effect that all the gas which passed the meter was not consumed, and consequently should not be paid for. Had the Sheriff given effect to this argument, gas managers everywhere would have had insurmountable difficulties in the matter of pressure to deal with. It was, truth to say, an impossible position to take up, because gas pressures are so variable. But legal decisions are framed without regard to the consequences; and if the Sheriff had elected to put the interpretation upon the word "consume" which the pursuer desired,

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 505.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 11	7	Bombay, Ltd.	6½—7*	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼*	..	5 6 8
50,000	10	Mch. 9	14	Bourne-mouth Gas and Water { 10 p.c.	28½—29½	..	4 14 11
51,810	10	,,	7	B 7 p.c.	16½—17½	..	4 0 0
53,200	10	,,	6	Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	263—268	..	4 13 3
300,000	,,	,,	9½	Do. New	200—205	..	4 12 8
50,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 16 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb.	105—108	..	3 14 1
220,000	Stk.	Mch. 9	11¼	Brighton & Hove Orig.	230—235	..	4 15 9
246,320	,,	,,	8½	Do. A. Ord. Stk.	165—170	..	4 17 1
460,000	20	Apl. 11	10	British	42—43	..	4 13 0
100,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c.	121—124	..	4 16 9
165,700	,,	,,	4½	Do. do. 3½ p.c.	92—95	..	4 14 9
500,000	10	May 11	7	Buenos Ayres (New) Ltd.	12—12½*	..	5 12 0
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
150,000	20	Mch. 9	8½	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	16¾—17¼	..	5 15 11
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	9¾—10¼	..	4 7 10
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,443,280	Stk.	Feb. 22	5½	Commercial 4 p.c Stk.	113—115	..	4 10 5
560,000	,,	,,	5	Do. 3½ p.c. do.	110—112	..	4 9 3
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	85—87	..	3 9 0
800,000	Stk.	,,	6½	Continental Union, Ltd.	128—131	−1	4 19 3
200,000	,,	,,	7	Do. 7 p c Pref.	143—148	..	4 14 7
432,070	Stk.	Feb.	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk.	105—107	..	3 14 9
486,090	10	Jan. 25	11	European, Ltd.	23½—24½	..	4 9 9
354,060	10	,,	11	Do. £7 10s. paid	18—19	+⅛	4 6 10
15,223,235	Stk.	Feb. 8	4⅘	Gaslight and Coke { 4 p.c. Ord.	97—99	..	4 8 11
2,600,000	,,	,,	3⅘	3½ p.c. max.	87—89	..	3 18 8
3,709,735	,,	,,	4	4 p.c. Con. Pref.	107—110	..	3 12 9
4,193,975	,,	Dec. 14	3	3 p.c. Con. Deb.	86—88	..	3 8 2
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	100—105	..	4 15 3
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124	..	5 4 10
70,000	10	Apl. 11	11	Hongkong & China, Ltd.	19½—20½	..	5 7 4
4 940,000	Stk.	May 11	8	Imperial Continental	175—177*	−1½	4 10 5
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Mch. 28	6	Lea Bridge Ord. 5 p.c.	121—126	..	4 15 3
561,000	Stk.	Feb. 22	10	Liverpool United A	235—237	..	4 4 5
718,100	Stk.	Feb. 22	7	Liverpool United B	169—171	..	4 1 10
306,083	,,	Dec. 29	4	L'rpool Unit'd Deb. Stk.	109—111	..	3 12 1
75,000	5	Dec. 14	5	Malta & Medn., Ltd.	4¼—4¾	..	5 5 3
560,000	100	Apl. 2	5	Met. of { 5 p.c. Deb.	102—104	..	4 16 2
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 15	3½	Monte Video, Ltd.	11½—12½	..	5 12 0
1,675,892	Stk.	Feb. 22	4⅝	Newc'tle & G'tesh'd Con.	109—110	+½	4 4 1
406,625	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	10	,,	7	Do. 7 p.c.	12½—13½	..	5 3 8
300,000	Stk.	May 11	8	Oriental, Ltd.	147—150*	..	5 6 8
600,000	5	Mch. 28	7	Ottoman, Ltd.	6—6½	..	5 7 8
398,490	5	Apl. 26	7	Primitiva Ord.	6½—7	..	5 0 0
796,980	5	Jan. 25	5	Do. 5 p.c. Pref.	5⅝—5⅞	..	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
851,070	10	Apl. 26	7	River Plate Ord.	12½—13	..	5 7 8
300,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
250,000	10	Mch. 28	8	San Paulo, Ltd.	13⅞—14¼	..	5 12 3
70,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50—52	..	4 16 2
135,000	Stk.	Mch. 28	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	243—245	..	4 1 8
126,106	Stk.	Mch. 9	5½	Shrewsbury Ord. 5 p.c.	109—119	..	4 12 5
70,000	10	Sept. 28	10	South African	15½—16½	−1	6 1 3
6,250,000	Stk.	Feb. 22	5½	South Met., 4 p.c. Ord.	126—128	+1	4 5 11
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Mch. 9	5½	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	May 11	5	Southampton Ord.	105—110*	..	4 10 11
120,000	Stk.	Mch. 9	6¼	Tottenham and { A 5 p.c.	124—127	..	4 18 5
363,020	,,	,,	4¼	B 3½ p.c.	99—102	..	4 13 2
137,500	,,	Dec. 14	4	Edmonton { 4 p.c. Deb.	105—107	..	3 14 9
182,380	10	Dec. 29	8	Tuscan, Ltd.	10¼—10¾	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
30,000	Stk.	Feb. 22	7¼	Wandsworth and { A 5 p.c.	—	..	—
255,636	,,	,,	6¼	B 3½ p.c.	133—136	..	4 11 11
75,000	,,	,,	5 5/16	C 3½ p.c.	110—113	..	4 16 0
69,416	,,	Dec. 29	3	Putney { 3 p.c. Deb. Stk.	82—85	..	3 10 7
745,872	,,	Mch. 9	5⅛	West Ham 5 p.c. Ord.	107—109	..	4 14 0
185,000	,,	,,	5	Do. 5 p.c. Pref.	122—125	..	4 0 0
193,300	,,	Dec. 29	4	Do. 4 p.c. Deb. Stk.	106—109	..	3 13 5

Prices marked * are "Ex div."

and his decision had been upheld, there would have been a revolution in gas supply. But the wording of the Gas-Works Clauses Act is such that he could not give the word this meaning, because it says that the register of the meter shall be *primâ facie* evidence of the quantity of gas consumed. If the word "burned" had been used in the Act instead of the word "consumed," Mr. Turner's argument would have had more force; and certainly the price of gas which might escape by leakage would have been irrecoverable, which shows the wisdom of the Legislature in employing a word which had a wide meaning.

The Newburgh Gas Company have paid a dividend at the rate of 5 per cent., free of income-tax, and have set aside £130 to meet the outlay upon gas-cookers. The Aberfeldy Gas Company have agreed upon a dividend at the rate of 4 per cent. for the year, and to retain the price of gas at 6s. 8d. per 1000 cubic feet.

The Directors of the Buckie Gaslight Company reported, at the annual meeting of shareholders on Saturday last, that, after making allowance for depreciation on buildings and plant as in the previous year, the profit for the year amounted to £311. A dividend at the rate of 7½ per cent. was declared, absorbing £149; and the balance was carried forward. There is a continued increase in the consumption of gas; and the price was reduced from 6s. 0½d. to 5s. 10d. per 1000 cubic feet to ordinary consumers, and for cooking, heating, and motive power from 5s. to 4s. 9d.

Ex-Provost M'Dougall, the Convener of the Gas Committee, intimated to the Forfar Town Council this week that it is proposed to hold an exhibition of gas cookers in the Reid Hall some time in June.

The Public Health Committee of the Edinburgh Town Council had before them on Tuesday a letter from the Local Government Board, requesting to be furnished with reports by the Medical Officer of Health and the Sanitary Inspector upon the smells emanating from the Granton Gas-Works. The Medical Officer of Health—Sir Henry Littlejohn—has already reported to the Town Council upon the matter; but the Sanitary Inspector has not, and the Committee agreed that he should be instructed also to report, in order that they may comply with the request of the Local Government Board.

Gas Profits at St. Helens.—At a meeting of the Gas Committee of the St. Helens Corporation on Wednesday, it was mentioned, we understand, that the profits on the gas undertaking in the past financial year amounted to upwards of £9500, against £11,000 in the previous year. They would have exceeded those of the previous year had it not been for the reduction made in the price of gas.

Sale of Saxmundham Gas-Works.—The latest gas-works to be acquired by Messrs. Schultz, Comins, and Co., are those at Saxmundham, which will be taken over as from July 1 next. The undertaking was offered to the Urban District Council two or three years ago; but nothing resulted. The Company owning it was a private one; and the number of shareholders had been reduced to five. Mr. Schultz is well known as the Secretary of the Ascot District Gas Company.

CURRENT SALES OF GAS PRODUCTS.

Week ending May 19.

There is a growing inquiry for pitch in the London district; but the position for the time being remains unaltered. London makers have sold considerable quantities to the end of the year, and therefore see no need to accept anything like current nominal prices for forward delivery. 60° crude carbolic acid remains in good demand, and 1s. 10d. net is freely bid for it; but makers have very little stock, and expect higher prices. Benzol, 90 per cent., is hardly so firm, and is quoted just under 9¾d. net. A large quantity of ordinary London creosote has been sold during the week at over 2d. per gallon, in bulk, at makers' works. Sulphate of ammonia at present maintains the same dead level as for some time past. It appears that all prompt parcels are easily disposed of.

LIVERPOOL, *May* 19.

Sulphate of Ammonia.

Although within the week there has been a fair amount of buying, it has not been enough to sustain prices, and the closing quotations are down to £12 per ton f.o.b. Hull, £12 2s. 6d. to £12 3s. 9d. per ton f.o.b. Liverpool, and £12 5s. per ton f.o.b. Leith. Scotland has been the best market, and up to £12 7s. 6d. per ton f.o.b. Glasgow has been paid in the case of urgent orders, buyers having deferred their purchasing too long, in the hope of doing much better. The forward position remains very much as last reported, except that there seems to be greater anxiety on the part of the smaller makers to sell their output up to the end of the year. The large makers in Scotland and London have been less concerned to sell ahead at prices obtainable, remembering that the tone of the market during the past three months has been of the kind to deter buyers from operating ahead, and that the heavy buying has for the most part still to be done. Speculators, however, continue to take orders at a discount on the spot level of prices.

Nitrate of Soda.

This article is quiet but steady on spot at 11s. 7½d. to 11s. 10½d. per cwt., according to quality.

LONDON, *May* 19.

Tar Products.

Markets have been fairly steady during the past week, and there appears to be rather more inquiry all round. In pitch, there is certainly more offering for prompt delivery; manufacturers being apparently anxious to clear out their stocks before the very hot weather. London makers still ask 32s. forward; but dealers have offered to accept 27s. 6d. for prompt. Yorkshire manufacturers are not now offering anything forward, as several of the large tar contracts will not be settled until later on. It is reported that 28s. 6d. has been offered for September-December for special qualities; but makers have declined to sell on these terms. In Lancashire, there is not very much

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PREVENTS NAPHTHALENE DEPOSITS.

OVER **120** MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gaslight and Coke Company, Manchester Exeter, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past **Ten Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

7, BISHOPSGATE STREET WITHOUT, LONDON, E.C.

business doing; and it is very difficult indeed to fix actual values, as several makers report small sales at good prices. Benzol is decidedly quiet, and it is reported that a little business has been done at 9½d. to 9¾d. for 90 per cent. for home consumption. In the North, sales have been made at 9d. for early delivery at out ports; but there is very little business doing. As to 50-90 per cent., this appears to be quite neglected, though Yorkshire makers are again reported to have declined 10d. for prompt and forward. There appears to be a very good inquiry for toluol, and an offer of 1s. 1d. is reported to have been declined by a London manufacturer for May-June delivery. Solvent is very scarce so far as London is concerned. It is reported that 1s. 2d. has been paid for special qualities for forward delivery; but in the North, 1s. may be taken as the actual value for ordinary quality. Carbolic acid has been very firm throughout the past week, and there is a good inquiry for crude. German consumers have been prepared to pay 1s. 10d. for prompt and forward delivery; but manufacturers are not inclined to contract farther than June, for which they are asking 1s. 10⅛d. to 1s. 10½d. In crystals, it is reported that some important contracts have been arranged during the past week at prices varying from 5⅝d. to 6d. for 39-40 per cent.; and the inquiry appears to be very good in both this article and crude. It is just possible that higher prices may rule later. Creosote is very firm indeed, especially in the Yorkshire district, where a fairly large business has been done at 1⅛d. to 1⅛d. at makers' works; and they now ask 1⅛d., which price, however, consumers are not prepared to pay—believing in an easier market for forward delivery. London manufacturers still ask 1⅛d. to 2d., but are not anxious to sell even at these figures. In Lancashire, there is not much offering; but the price may be taken as about 1½d., at which consumers are prepared to purchase, though makers ask rather higher prices. There is really nothing doing in anthracene; neither manufacturers nor consumers appear to take any interest in the article.

The average values during the week were: Tar, 15s. 6d. to 21s. Pitch, London, 27s. to 27s. 6d.; east coast, 26s. to 26s. 6d.; west coast, 25s. to 25s. 6d. Benzol, 90 per cent., 9½d. to 9⅝d.; 50 to 90 per cent., 10d. to 10¼d. Toluol, 1s. 1d. Crude naphtha, 3⅝d. to 4d.; solvent naphtha, 1s. 0⅛d. to 1s. 1½d.; heavy naphtha, 11d. to 11⅝d. Creosote, London, 1⅛d. to 1⅛d.; North, 1⅛d. to 1⅛d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 10¼d. to 1s. 10½d. Naphthalene, £4 10s. to £8 10s.; salts, 19s. to 20s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market for this article has been fairly steady during the past week, though values remain practically unchanged. The Gaslight and Coke Company still maintain their nominal quotation at £12 7s. 6d.; but there are sellers on Beckton terms at £12 to £12 2s. 6d., which may be taken as about the actual value. In Hull, there has not been much business doing; but it is reported that £12 2s. 6d. has again been accepted for one or two small lots. In Liverpool, sellers are reported of good grey at £12 2s. 6d.; and from this price to £12 5s. may be taken as the nominal quotation. In Leith, there has been some demand for prompt shipment, as a large boat is due to load there; and it is reported that £12 7s. 6d. has been both paid and refused for early delivery, but buyers would not exceed £12 5s. forward.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The continuance of cold, wet weather preserves the house coal trade; and there has been a large distribution during the past week from the Wigan and Tyldesley coalfields to various parts of the country. Several vessels have also taken cargoes from the Ship Canal docks and from the Partington coal tips for the Vale of Oban, Sligo, and other ports. Steam coal and all kinds of engine fuel are in good demand. Gas coal and cannel is a slow trade—deliveries being chiefly under contract as arranged. A good deal of coal finds it way from the Midlands into the Lancashire manufacturing districts. Prices of coal on the Manchester Exchange showed no variation from the figures published last week.

Northern Coal Trade.

The coal trade has shown further ease; but in the last two or three days, there have been signs of a fuller demand and of rather firmer prices. Some large contracts have been given out which have steadied the markets, and which should improve the position. In the steam coal trade, best Northumbrians are now quoted at from 10s. 6d. to 10s. 9d. per ton f.o.b. for early delivery, second-class steams are 10s., and steam smalls 6s.—for delivery over the season rather generally asked. The collieries are now working better; and the tendency of this part of the trade is an improving one. In the gas coal branch, home deliveries are rather lower; but the exports seem to be good for this season of the year. Occasional cargoes of gas coals are being sold at from 9s. to 10s. per ton f.o.b., according to the quality—the best kinds being relatively the firmer. More contracts have been settled for the last of the series for the Metropolitan Gas Companies; and it is believed that for good Durham gas coals the price will leave about 9s. 4d. per ton f.o.b. As freight, &c., are included in the actual price, however, there is no certainty as to the amount left for the coal at the port of loading. Coke is quiet; and gas coke shows no change in the position this week.

Scotch Coal Trade.

Trade has been a trifle quieter, but has not by any means diminished in volume. Prices remain stationary, and are quoted at: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 9s. to 10s. 3d., and splint 9s. 6d. to 9s. 9d. The shipments for the week amounted to 300,427 tons—an increase of 9403 tons upon the preceding week, and of 70,571 tons upon the same week of last year. For the year to date, the total shipments have been 4,771,926 tons—an increase of 609,749 tons upon the corresponding period of 1905.

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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Buffalo, N.Y.	2,000,000	Newcastle-on-Tyne	1,800,000
Windsor St. Works, Birmingham	2,000,000	Winnipeg, Man.	500,000	Leeds	1,800,000
Saltley Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Malton	150,000
Colchester	300,000	York	750,000	Smethwick	500,000
Birkenhead	2,250,000	Rochester	500,000	Gravesend	300,000
Swindon (New Swindon Gas Co.)	120,000	Kingston, Ont.	300,000	Pernambuco, Brazil	125,000
Saltley, Birmingham (Second Contract)	2,000,000	Crystal Palace District	2,000,000	Duluth, (Second Contract)	300,000
Windsor St., Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Leicester (Second Contract)	1,000,000
Halifax	1,000,000	Caterham	150,000	Newport (Second Contract)	250,000
Toronto	250,000	Leicester	2,000,000	Brockville	250,000
Ottawa	250,000	Enschede, Holland	150,000	Toronto (Third Contract)	750,000
Lindsay (Remodelled)	125,000	Buenos Ayres (River Plate Co.)	700,000	Montreal, Ont. (Second Con.)	1,800,000
Montreal	500,000	Burnley	1,500,000	Toronto (Fourth Contract)	1,000,000
Toronto (2nd Cont., Remodelled)	2,000,000	Kingston-on-Thames	1,750,000	Hamilton, Ont.	400,000
Belleville	250,000	Accrington	500,000	Rochester (Third Contract)	1,600,000
Ottawa (Second Contract)	250,000	Tonbridge	300,000	Leeds (Second Contract)	900,000
Brantford (Remodelled)	200,000	Stretford	500,000	Buenos Ayres (Primitiva Co.)	1,200,000
St. Catherines (Remodelled)	250,000	Oldbury	300,000	Buenos Ayres (New Co.)	1,200,000
Kingston, Pa.	125,000	Todmorden	500,000	Christchurch, N.Z.	300,000
Peterborough, Ont.	250,000	Saltley, Birmingham (Third Contract)	2,000,000	Rochdale	1,600,000
Wilkesbarre, Pa.	750,000	York (Second Contract)	750,000	St. John's, Newfoundland	250,000
St. Catherines (Second Cont.)	250,000	Rochester (Second Contract)	500,000	Brantford (Second Contract)	400,000
		Newport (Mon.)	250,000	Smethwick (Second Contract)	500,000
		Tokio, Japan	1,000,000	Pontypridd	250,000
				Montreal (Third Contract)	1,800,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

The Flame Arc Lamps at Chelmsford.

At a recent meeting, the Chelmsford Town Council agreed to the recommendation of the Lighting Committee that the Electric Lighting Company should be offered £100 in settlement of their account of £132 odd for the flame arc lamps for the quarter ended March 25, and that they should be called upon to forthwith erect arc lamps which would give a steady light equal in candle power to what they had undertaken to provide. The dissatisfaction felt at the lighting was referred to in the "JOURNAL" for May 1 (p. 331), when it was stated that Messrs. Crompton and Co., who supplied the lights, expressed regret that they had not come up to expectations, and admitted that certain troubles had developed which they did not anticipate.

Gas Poisoning in a Bathroom in Glasgow.—On the evening of Saturday, the 12th inst., a young man named William Clark, residing at 53, Holmhead Street, Glasgow, was found dead in the bathroom of the house. His father, getting no response from him when he knocked at the door, forced an entrance, and found him in a sitting posture in the bath, and quite dead. The gas-fire for heating the water was lighted.

A Gas Supply for Witton Park.—Witton Park, in Durham, which has for some sixteen years been without a gas supply, is once more to have placed at its command this convenient source of light and heat. The Ayton and District Gas Company are carrying out a scheme which is expected to be in operation by September. A holder has been put down; and the Parish Council are to take lamps at £3 per annum. The charge to private consumers will be 3s. 9d. per 1000 cubic feet; and, in addition, prepayment meters will be introduced.

Accidental Poisoning by Gas.—An inquest was held at the Tottenham Coroner's Court last Thursday respecting the death of Augustus W. Dennington, aged 64, a clerk, who lived in Mount Pleasant Road; the deceased and his wife occupying a flat. The latter went away for a holiday at Easter, and since then the husband had been living practically alone. His son had called on him two days previously, and failing to get an answer, forced an entry, and found his father lying on a bed dead. The gas was turned on; and the medical evidence showed that he had been asphyxiated. The tap of the gas-bracket turned very easily, and it was suggested that deceased might have touched it in shutting a window. The Jury returned a verdict of accidental death.

Water-Works for Nevin.—On Saturday, the 12th inst., the President of the Board of Trade (the Right Hon. D. Lloyd-George) opened the water-works which have been constructed for the supply of Nevin. This town and Morfa Nevin have a population of about 1600, which during the summer months is augmented by 300 or 400 visitors. The storage reservoir has a capacity of 540,000 gallons; and the supply will be at the rate of 21 gallons per head. The scheme will cost about £4000. Mr. Evan Evans, Assoc.M.Inst.C.E., the County Surveyor, of Carnarvon, was the Engineer, and Mr. P. Edwards, of Chester, the Contractor. The work has been carried out without dispute or difficulty of any kind, though the rights of riparian owners were numerous and complicated.

Price of Gas at Linthwaite.—A public meeting to consider the question of the price of gas at Linthwaite was held last Wednesday evening. Mr. Reynolds occupied the chair, and observed that there was no doubt the people were of one opinion in regard to the matter—that the price of gas was too high, and that they were entitled to ask the Slaithwaite Gas Company to make a reduction to the same level as the Milnsbridge end of the township paid. Mr. Freer gave particulars as to the price and profits of the Marsden Gas-Works, which, supplying at 2s. 6d. per 1000 cubic feet, made a surplus profit of £1200. He also explained what had been done by the Council with regard to electric lighting. Eventually it was unanimously agreed to appoint a deputation to interview the Slaithwaite Gas Company, and report to a meeting to be held subsequently.

An Auditor on the Southport Water Board.—Mr. Samuel Hardman, of Southport, who was recently elected one of the Burgess Auditors for that borough, has issued a strong statement with reference to the finances of the Southport, Birkdale, and West Lancashire Joint Water Board. He says that the net income of the concern for 1905 was £26,200. The Corporation of Southport and the Urban District Council of Birkdale are liable for any deficiency of income, though the West Lancashire Rural District Council are not, but have an agreement that the rate for the supply of water for their district shall not exceed the rate when the concern was taken over by the Water Board in 1901. Mr. Hardman contends that at least £200,000 too much was paid for the property. He is of opinion that a sinking fund on over £1,000,000 of capital will have to be added to the precept shortly, and that this will raise the rates to a serious extent. He urges various measures, including the taking over of the entire management of the staff and officials by the Southport Corporation.

Reduction in Price at Cockermouth.—Acting on the recommendation of the Gas Committee, the Cockermouth Urban District Council have decided to reduce the price of gas to ordinary consumers from 3s. 3d. to 2s. 11d. per 1000 cubic feet, and that the quantity of gas supplied for 1d. to prepayment meter users shall be increased from 22 to 25 cubic feet. These concessions (which will amount to nearly £400 a year) have been rendered possible by the substantial balance, resulting from the past twelve months' working, on which the Manager (Mr. A. F. Young) and the Committee were highly complimented. The accounts showed that, after charging £125, the cost of new land purchased, on the year's working there was a gross profit of £1492. Deducting from this amount £538 interest on loans, and £444 principal repaid, the net balance of profit was £510; and this sum increases the working balance from £2024 to £2534. The Chairman of the Committee (Mr. Fleming) said the balance-sheet was the best ever submitted to the Council. The works were in a more efficient state than they had ever been; and all the improvements had been paid for out of revenue. In 1901, the profits were £646; in 1902, £931; in 1903, £1031; in 1904, £1226; in 1905, £1194; and in 1906, £1492.

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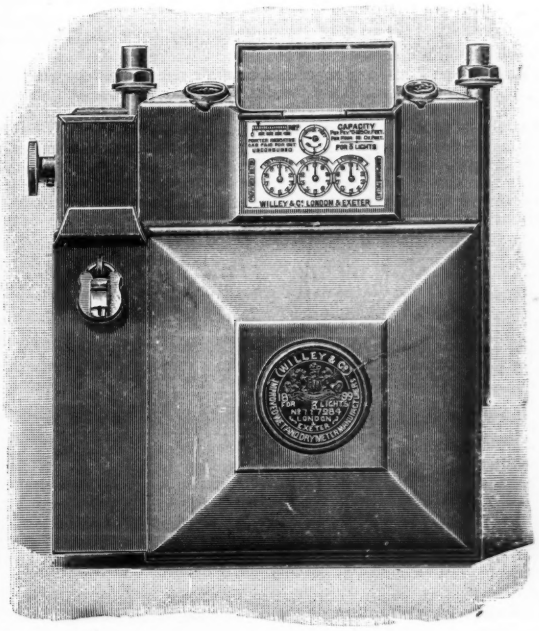

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Abandonment of the Yarmouth Water-Works Purchase Scheme.—At the last meeting of the Yarmouth Town Council, the General Purposes Committee submitted a recommendation to the effect that, having regard to the present state of the Money Market, it was inadvisable to seek to acquire the undertaking of the Water Company, as this could not be purchased without unduly burdening the rates for a considerable number of years. Some objection was raised to the recommendation; but it was eventually adopted.

Water-Main Extensions at Chesterfield.—A Local Government Board inquiry was held at Chesterfield last week regarding an application of the Gas and Water Board for sanction to borrow £7000 for the purpose of laying new mains which will enable them to utilize the water from the Whispering Well at Holymoorside. Mr. Middleton presented the case on behalf of the Board, and explained that the main they proposed to lay was a 9-inch one. To make use of the Whispering Well, it was necessary to lay a main which would bring the water into their system or alternatively into the reservoirs. The water in question was partly spring and partly stream from the hills and moors, and formerly provided the supply to the village of Holymoorside. It belonged to the Duke of Devonshire, and the Board had acquired the rights of the Brampton and Walton Urban District Council to develop it.

Water-Works Profits at Leeds.—The gross income of the Leeds Water Committee for the year just ended was £162,648; the gross profit being £118,917. Interest on loans and income-tax amounted to £67,653; the net profit carried forward being £51,263. Out of this, there has been paid on redemption fund over £50,000; leaving a net surplus profit of £19,497. The net profit for the preceding year was £11,939. The profits for the year just concluded are the biggest that have been made in the history of the water-works. The estimated profit was £11,000; and the excess is accounted for by the fact that there has been a considerable reduction in the working expenses, economies having been effected in nearly every department. There has also been a closer inspection of the supplies. The net surplus profit has been made, notwithstanding the fact that there has been an increase of £2400 on the rates of the water-works.

The Hathersage and District Gas Company, Limited, has been registered with a capital of £10,000, in £1 shares, to supply gas to Hathersage, Bamford, and the district.

Near Vauxhall Bridge there has just been unearthed one of the old wooden water-pipes once generally used in London, and from time to time brought to light in the course of street work. They were formed of tree trunks hollowed, and fitted into each other. South London a century ago obtained part of its water supply from the Thames at Vauxhall Bridge.

The Carron Company have sent us their supplementary catalogue of gas appliances, comprising cookers, grillers, gas-ovens, boiling-burners, gas-irons, hot-plates, portable gas-boilers, &c., all of which are effectively illustrated. They are preceded by some remarks on the advantages of cooking by gas and a series of useful directions for using the cookers. The catalogue is a neatly printed pamphlet, of convenient size, in a wrapper, on which space is left for the insertion of the name of any company or corporation desirous of having a supply of them for distribution.

We have received from Messrs. Parkinson and W. & B. Cowan, Limited, the new catalogue they have just issued for the stove department of their business. It contains a comprehensive collection of appliances for cooking and heating by gas, including their well-known "Crown" pattern cookers, a large assortment of prepayment cookers, gas fires, radiators, &c. These are well displayed in the 114 large quarto pages composing the catalogue, which is tastefully got up, bound in a stiff cover, and corded for hanging in an office, where it will prove useful for reference.

A correspondent has forwarded the following instructive illustration of "peaceful persuasion." At Porth, on Thursday, David Hill, haulier, of Tylorstown, charged Morgan Davies with assault. Complainant, who had two black eyes, said the dispute was all over the new hauliers' agreement. He was considered a blackleg. On the previous Saturday evening, defendant met him in the back yard of the Tyler Hotel, Tylorstown, and knocked him down. A witness spoke to seeing complainant strike Davies after an argument on the hauliers' question. The Bench decided that the case had been made out, and fined Davies £5 or a month. Our correspondent wonders who paid, or will pay, the fine.

Messrs. Joseph Taylor and Co., of Bolton, have in hand saturators 1¾ inches thick, of their latest make, fitted with double detachable ammonia pipes, and detachable acid and steam pipes, for the Tottenham and Edmonton Gas Company and the Nelson Corporation; also a similar one, fitted complete on a pitch-pine cradle, and having a 2-inch plate-lead well and bottom, made either for hand fishing or steam discharging, for the Plymouth and Stonehouse Gas Company. The firm have delivered one of their latest makes of timber-cased saturators to the Holyhead and North Wales Gas Corporation. Several large orders for 10-ton acid tanks, sulphate drainers, saturators, &c., have been received in connection with coke-oven plants about to be erected.

Mr. F. L. Ramsden, the Manager and Engineer of the Burton-on-Trent Gas-Works, has sent us a few copies of a folded card, bearing the title of "A Note from the Gas-Works," which he is circulating among the present and prospective users of gas-engines in the town. He brings under the direct notice of all who are interested in cheap power the fact that the price of gas has lately been reduced when employed for this purpose or for heating; and he gives the present charges in prominent figures. There are already supplied from the mains of the Corporation about 140 gas-engines, of various sizes up to about 50-brake-horse-power, doing different kinds of work; and certainly the low figures at which gas can now be procured should lead to its extended use. Mr. Ramsden utilizes his card, which is very neatly printed in red and black on a grey ground, for emphasizing the value of coke and breeze. It is altogether an effective advertisement.

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GAS AND WATER MANAGER. Milford Haven Urban District Council. Applications by June 12.

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LAINDON GAS AND WATER COMPANY.
MELTON MOWBRAY GASLIGHT COMPANY. June 12.
SOUTHEND WATER COMPANY. May 26.
SOUTH ESSEX WATER COMPANY. June 12.
WANDSWORTH AND PUTNEY GAS COMPANY. May 29.
WORTHING GASLIGHT COMPANY. June 12.

TENDERS FOR

Coal and Cannel.

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CARLISLE GAS DEPARTMENT. Tenders by June 4.
DENBIGH GAS AND COKE COMPANY. Tenders by May 31.
DONCASTER GAS DEPARTMENT. Tenders by June 7.
DUKINFIELD GAS DEPARTMENT. Tenders by May 28.
DUDLEY GASLIGHT COMPANY. Tenders by May 28.
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NOTTINGHAM WATER DEPARTMENT. Tenders by May 26.
OXFORD GASLIGHT COMPANY. Tenders by June 9.
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EDINBURGH AND LEITH CORPORATIONS GAS COMMISSIONERS. Tenders by May 28.

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Valves, Taps, Fittings, Lead, and Lead Pipe, &c.

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JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS ELLAND.

APPLICANTS for the Appointment of SHOW-ROOM MANAGER, &c., to the Gosport Gas and Coke Company are THANKED, and informed that the POSITION IS NOW FILLED.

RESIDENT ENGINEER FOR 60-MILLION WORKS.

MESSRS. H. E. Jones and Son have to acknowledge a very large number of Applications for this Appointment, and regret that the number is so great as to compel them to take this form of reply.

They wish to notify that those Applicants who have not received requests for Testimonials have not been successful.

WANTED, Gentleman calling on Gas Companies and others to introduce Novelty in Inverted Gas-Burners line.

Apply, by letter, to No. 4603, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Assistant-Superinten- dent for Gas Plant in Canada, Carbonizing 100,000 tons of coal annually.

Applicants must give full details of past Experience, Qualifications, and Accomplishments, also Age, References, and Salary expected, to Box 2396, Montreal, CANADA.

SHOW-ROOM Manager seeks Appoint- ment. Practical and thoroughly Experienced in every description of Gas Appliances. Accustomed to Control of Workmen, Estimating, Advising Consumers, &c. References.

Address ADVERTISER, 9, Montrose Villas, Putney, LONDON.

EAST GRINSTEAD GAS AND WATER COMPANY.

WANTED, a thoroughly experienced CLERK capable of keeping the various Accounts of the Company.

Applications, endorsed "Application for Clerkship," accompanied by *copies* of at least Three Testimonials (which will not be returned), and stating Age, Qualifications, and Salary required, to be sent to the undersigned on or before the 5th of June next.

Selected Candidates will be written to.

EVELYN ALSTON HEAD,
Secretary.

East Grinstead,
May 11, 1906.

MILFORD HAVEN URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

APPLICATIONS are invited for the position of MANAGER to the Gas and Water Undertakings of the above-named Council.

The person appointed must be an exclusive servant of the Council, and thoroughly conversant with every branch of Economical Manufacture of Gas, and Distribution of Gas and Water, including Maintenance of Plant, Mainlaying, &c. Complete personal superintendence indispensable. Gas production, about 7½ Millions.

Salary £120 per annum. Age from 25 to 45. Duties to commence on the 1st of August next.

The person appointed will be required to give security for the faithful discharge of his duties in the sum of £100 in an approved Guarantee Society.

Applications, endorsed "Gas and Water Manager," stating Age, Experience, and enclosing Three recent Testimonials, to be sent to me not later than the 12th day of June next.

Canvassing, either directly or indirectly, is strictly prohibited.

THOMAS H. LEWIS,
Clerk to the Council.

District Council Offices,
Milford Haven, May 19, 1906.

WANTED, Copper Scrap, 72s.; Brass, 48s.; Zinc, 16s.; Lead Ashes, 8s. Also old Wet Gas-Meters bought.

ROSSE WORKS, Leeds Road, BRADFORD.

WANTED, Four Chambers for Am- monia Still, 4 ft. 11 in. diameter over all, 8 in. deep. Second-Hand preferred.

Address No. 4596, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, Cheap—24-inch Specials, Bends, Tees, Elbows, and 24-inch Valves. All in good condition. Makers, Newton, Chambers, & Co.

Apply T. DUXBURY AND CO., MANCHESTER.

PURIFIERS for Sale. Splendid set of Four 10-feet square Boxes, planed joints, new Covers. Re-erected cheap for immediate sale.

Also sets of 12-feet, 16-feet, 20-feet, and 30-feet square PURIFIERS, erected Complete and Perfect.

FIRTH BLAKELEY, Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters. Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

SUNBURY GAS CONSUMERS COMPANY.

OFFERS invited for—

Two ⊃-shaped Steel Hydraulic MAINS for Six Retorts 8 ft. 6 in. long (good as new).
Two VALVES.
12 Circular MOUTHPIECES, 16 inches in diameter.
12 Ascension PIPES 6 in. to 5 in., with Dip and Arch Pipes complete.

All in good condition.

Any further Particulars from S. BARK, Manager.

FOR SALE.

THE Penrith Urban District Council have the following APPARATUS for Sale—

One 10,000 cubic feet per hour STATION METER, by Cowan's, with 10-inch Connections and Hydraulic Valves.
One Dempster's RECIPROCATING EXHAUSTER.

Further Particulars may be obtained on application to—

E. SHAUL,
Engineer and Manager.

Gas-Works, Penrith.

CITY OF CARLISLE.

THE Carlisle Gas Committee are pre- pared to receive TENDERS for the COAL and CANNEL required at their Works during One Year from the 1st of July next.

Tenders, endorsed "Coal," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk not later than June 4, 1906.

Form of Tender and other Particulars may be had on application to the undersigned.

W. J. SMITH, B.Sc.,
Engineer and Manager.

Gas-Works, Carlisle,
May 19, 1906.

CITY OF CARLISLE.

THE Carlisle Gas Committee are pre- pared to receive TENDERS for the FIRE-CLAY, RETORTS, FIRE-BRICKS, &c., required at their Works during One Year from the 1st of July next.

Tenders, endorsed "Fire-Clay," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk not later than June 4, 1906.

Form of Tender, giving Quantities, &c., will be forwarded on application to the undersigned.

W. J. SMITH, B.Sc.,
Engineer and Manager.

Gas-Works, Carlisle,
May 19, 1906.

CITY OF BIRMINGHAM.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee invite Tenders for the supply of GAS COAL and CANNEL to the Corporation Gas-Works during the Year ending the 30th day of June, 1907.

Forms of Tender, returnable on or before Wednesday, the 30th inst., can be obtained on application at my office.

G. HAMPTON BARBER,
Secretary.

Council House, Birmingham,
May 18, 1906.

ACCRINGTON DISTRICT GAS AND WATER BOARD.

THIS Board invite Tenders for the sur- plus TAR and AMMONIACAL LIQUOR which may be produced at the Accrington and Great Harwood Works of the Board, during the Year from the 1st of July next to the 30th of June, 1907.

The estimated quantity of Tar is 2000 Tons, and Liquor 5000 Tons.

Sealed Tenders, endorsed "Tar and Liquor," addressed to the Chairman of the Board, must be in my hands on or before Tuesday, the 12th of June.

By order,
CHARLES HARRISON,
General Manager.

General Offices, Accrington,
May 17, 1906.

SKIPTON URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Council invite Tenders for the supply of about 7000 Tons of best GAS COAL, Screened, Unscreened, and Nuts, to be delivered free at the Railway Station, Skipton, or at the Council's Wharf adjoining the Gas-Works in Skipton on the Leeds and Liverpool Canal, between June 30, 1906, and July 1, 1907, in monthly quantities.

Full Particulars as to periods and quantities of deliveries, &c., and Form of Tender may be obtained from the Manager, Mr. J. H. Woodward, Gas-Works, Skipton, and Tenders, endorsed "Tender for Gas Coal," are to be sent to the Chairman of the Gas Committee, Gas-Works, Skipton, on or before Thursday, May 31, 1906.

The lowest or any Tender not necessarily accepted.

RICHARD WILSON,
Clerk to the Council.

SKIPTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TAR.

THE Council invite Tenders for the purchase and removal of Surplus TAR produced at the Skipton Gas-Works between the 30th of June, 1906, and the 1st of July, 1907.

Probable quantity, 400 Tons.

Further Particulars may be obtained from Mr. J. H. Woodward, Gas-Works, Skipton, to whom Tenders, endorsed "Tar," are to be sent before Thursday, the 31st of May, 1906.

RICHARD WILSON,
Clerk to the Council.

TYLDESLEY-WITH-SHAKERLEY URBAN DISTRICT COUNCIL.

THE Gas Committee of the above Council invite TENDERS for ALTERATIONS to HYDRAULIC MAINS, including new Gas Tar and Liquor Take-Off Pipes, and Erection of Two TAR TOWERS.

Plan of same may be seen at the Gas-Works, Tyldesley, and Specification and Tender Form obtained from the Engineer, Mr. R. H. Ginman.

Sealed endorsed Tenders, on Official Forms only, to be sent to the undersigned not later than noon on the 29th day of May inst.

By order,
W. J. MATTHEWS,
Clerk to the Council.

Council Offices, Tyldesley,
May 15, 1906.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 33,000 Tons of GAS COAL for One Year from the 1st day of July next, in such Monthly quantities as may be required by the Company.

Tenders to state the Price delivered at the Midland Railway Sidings, Hempsted, near Gloucester, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf, on the Gloucester and Berkeley Canal.

Further Particulars, and Forms of Tender may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the Description and Quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than Saturday, the 2nd day of June next.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester,
May 7, 1906.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

THE Commissioners are prepared to receive TENDERS for the supply of about 2000 Tons of OXIDE OF IRON suitable for Gas Purification Purposes, delivered into Waggons, ex ship Granton Harbour, free of all charges, or in Railway Waggons (North British or Caledonian Railways), Granton Gas-Works.

Intending Contractors will be required to furnish the Engineer with the fullest Information as regards the material to be supplied, which shall contain not less than 60 per cent. of $Fe_2 O_3 H_2 O$ in the mass after evaporation of the moisture at a temperature of 212° Fahr.; further, the free moisture in the mass shall not exceed 50 per cent. Preference will be given to a strongly fibrous material containing the above percentages of per Oxide of Iron.

Contractors offering for new Oxide will also be required to quote the Commissioners for the removal of the Material when Spent; quotations on the basis of so much per unit of Sulphur in the mass being given.

Any further Information may be obtained upon application to Mr. W. R. Herring, General Manager, Gas-Works, New Street, Edinburgh.

Deliveries to take place in quantities and at such times as may be agreed upon between the time of the acceptance of the Tender and the 30th of September next.

Tenders to be lodged at or before Ten a.m. on Monday, the 28th day of May, 1906, sealed, and endorsed "Tender for Oxide of Iron," and addressed to the undersigned.

The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place,
Edinburgh, May 15, 1906.

CITY OF NOTTINGHAM.

(WATER DEPARTMENT.)

TENDERS FOR THE SUPPLY OF VALVES AND HYDRANTS, PIPES, LEAD, COAL, TAPS, AND FITTINGS.

THE Water Committee of the Corpora- tion are prepared to receive TENDERS from competent Ironfounders, Brassfounders, Valve Manufacturers, Lead Merchants, and Colliery Proprietors and Coal Merchants for the supply of the under-mentioned goods for the ensuing Year—

1—Cast-Iron Double-Faced SLUICE VALVES and HYDRANTS.
2—Cast-Iron MAIN PIPES and SPECIAL PIPES.
3—LEAD PIPING. LEAD INGOTS.
4—GUN METAL TAPS and FERRULE FITTINGS.
5—STEAM COAL and OTHER FUEL.

Specifications and Drawings, together with Samples, Weights, &c., may be seen, and other Information obtained, at the Office of the Water Engineer, Mr. F. W. Davies, St. Peter's Church-side; and Forms of Tender may be obtained at that Office on payment of One Guinea, which sum will be returned on receipt of a *bonâ-fide* Tender.

Tenders, endorsed "Tender for Valves," "Tender for Pipes," "Tender for Lead," "Tender for Taps," or "Tender for Coal," to be delivered to me at the Guildhall, Nottingham, on or before the 11th day of June next. Samples of Coals for Testing Purposes must be sent in not later than the 26th of May, or the Tenders will not be considered.

The Committee do not bind themselves to accept the lowest or any Tender.

By order of the Water Committee,
SAMUEL G. JOHNSON,
Town Clerk.

Guildhall, Nottingham,
May 15, 1906.

DUKINFIELD GAS-WORKS.

TENDERS FOR TAR.

THE Gas Committee of the above Works require OFFERS for the 500 Tons of TAR to be produced in the Year commencing with the end of June next.

The Tar will be delivered on canal boat alongside the Works.

Tenders, endorsed "Tar," addressed to the Chairman by Monday morning, the 28th inst.

The highest or any Tender not necessarily accepted.

W. LINDLEY,
Manager.

Dukinfield, May 15, 1906.

HATHERSAGE AND DISTRICT GAS COMPANY, LIMITED.

THE Directors of the above Company invite TENDERS for the Building, Erection, and Equipment of a COMPLETE GAS-WORKS, at Hathersage, Derbyshire; the Works to be ready for Gas making for the 1st of October, 1906.

Drawings and Specification may be seen at the Office of the Engineer, Bakewell Road, Matlock.

Tenders, sealed and endorsed, to be delivered to Robert Hall, Esq., Gas Offices, Matlock, on or before June 1, 1906.

THOMAS BROWN,
Engineer.

Matlock, May 16, 1906.

BARNOLDSWICK URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Erection of a Circular Brick CHIMNEY, 80 ft. high, and for the Dismantling of the existing Chimney, with Sundry Repairs and Alterations to Retort-House.

General Conditions of Contract, Specification, and Form of Tender may be obtained from the undersigned, on payment of 10s. 6d., which will be returned on receipt of a *bond-fide* Tender.

Drawings may be seen at the Town Hall, Barnoldswick.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed "Tender for Chimney," to be forwarded to J. M. Edmondson, Esq., Chairman Gas Committee, Town Hall, Barnoldswick, not later than Four p.m., May 30, 1906.

J. W. THOMPSON,
Manager Gas and Water Department.

Town Hall, Barnoldswick.

BOROUGH OF DONCASTER.

TENDERS FOR COAL.

THE Gas Committee of the Borough of Doncaster are prepared to receive TENDERS for the supply of 21,000 Tons of best screened GAS COAL, or GAS NUTS of equal quality, as may be selected by the Committee, during the Year ending June 30, 1907.

TENDERS FOR TAR.

They also invite TENDERS for the purchase of their surplus TAR, for disposal after the 30th of June next, in accordance with the terms of the Tender Form.

Particulars and Forms may be obtained on application to the undersigned.

Tenders should be sent, under seal, to the Chairman, endorsed "Coal" and "Tar" respectively, not later than Thursday, the 7th of June.

By order of the Gas Committee, who do not bind themselves to accept any Tender.

ROBT. WATSON,
Engineer and Manager.

Gas-Works, Doncaster,
May 17, 1906.

MANCHESTER CORPORATION GAS-WORKS.

TO OIL IMPORTERS AND OTHERS.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the supply, in Three Cargoes, during the Nine Months ending March 31, 1907, of 10,000 Tons of OIL for the Manufacture of Carburetted Water Gas.

Description of the Oil, Conditions of Contract, and further Particulars may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent of the Gas Department.

Sealed Tenders and Samples, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Oil," must be delivered at the Office of the Superintendent of the Gas Department, Town Hall, Manchester, on or before Thursday, the 31st of May, 1906.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
May 18, 1906.

BOROUGH OF TIVERTON.

TENDERS FOR COAL.

THE Lighting Committee are prepared to receive TENDERS for the whole or part of about 3500 Tons of screened GAS COAL or best NUTS (state if washed or otherwise) of the following descriptions—viz., New Pelton, Aldwarke Main, Rothervale, Barrow, Yorkshire Silkstone, Strafford Silkstone, Wharncliffe Silkstone, and Mirfield, to be delivered at the Railway Siding, adjoining their Gas-Works, at Tiverton during One Year.

Further Particulars and Form of Tender (which must be used) may be obtained on application to the Manager, Gas-Works, Tiverton.

Sealed Tenders, endorsed "Tenders for Gas Coal," and addressed to the undersigned, must be received on or before the 4th day of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
C. M. HOLE,
Town Clerk.

Tiverton, May 14, 1906.

BOROUGH OF WOKINGHAM.

(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the surplus TAR produced at their Works during the Twelve Months ending March 31, 1907.

Particulars may be obtained on application to the undersigned.

Tenders, endorsed "Tar," to be addressed to the Chairman, Gas Committee, on or before May 30, 1906.

FRANCIS H. WOOD,
Engineer and Manager.

Gas-Works, Wokingham.

LEATHERHEAD GAS AND LIGHTING COMPANY.

TAR.

THE Directors of the above Company are prepared to receive TENDERS for surplus TAR.

Tenders, endorsed "Tar," may be sent to the undersigned, from whom further Particulars can be obtained, not later than May 26, 1906.

JOHN YOUNG,
Secretary.

North Street, Leatherhead.

PETERBOROUGH GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of best quality of through and through GAS COAL, for a period of One or Two Years, commencing July 1 next, stating price per Ton in Waggons at Pit, Railway rate to Peterborough, and Waggon hire to Peterborough.

Tenders to be addressed to the Chairman of the Company, Gas-Works, Peterborough, endorsed "Coal," and delivered not later than the 9th day of June next.

Special Tender Forms are not provided.

The Directors do not bind themselves to accept the lowest or any Tender.

JOHN BARTON,
Secretary and Manager.

Peterborough, May 19, 1906.

GAINSBOROUGH URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of 6000 Tons of best GAS COAL (Screened, Unscreened, and Nuts), to be delivered at the G.C. Railway Station, Gainsborough, between the 1st of July, 1906, and the 30th of June, 1907, in such quantities, monthly, as may be required.

Sealed Tenders, endorsed "Tender for Gas Coal," giving full Particulars of the Coal offered, to be addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works, Gainsborough, not later than the 26th inst.

No Special Form of Tender issued.

The Committee do not bind themselves to accept the lowest or any Tender.

JOHN BALDWIN,
Manager.

Gas-Works, Gainsborough,
May 10, 1906.

SWADLINCOTE DISTRICT URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee of the above Council are prepared to receive TENDERS for—

LIME.

The supply of about 150 Tons of Best Hand-Picked Buxton LIME, to be delivered at the Gas-Works in such quantities and at such times as may be required during the Twelve Months ending June 30, 1907.

GAS COAL.

The supply of 4000 Tons (more or less) of Best Screened GAS COAL, to be delivered in such quantities as may be required during the Twelve Months ending June 30, 1907.

All Particulars and Form of Tenders may be obtained from Mr. G. B. Smedley, the Engineer and Manager.

Tenders must be on the Council's Forms and En velope, and accompanied by Analysis, and must be delivered to the undersigned on or before Twelve noon, May 30, 1906, endorsed "Lime," "Gas Coal," as the case may be.

The Council do not bind themselves to accept any Tender.

W. A. MUSSON,
Clerk to the Council.

Gas-Works, Swadlincote,
May 11, 1906.

HAYWARDS HEATH DISTRICT GAS COMPANY.

GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 2900 Tons of GAS COAL (more or less) to be delivered in such quantities and at such periods as may be ordered between the 1st day of July, 1906, and the 30th day of June, 1907.

The Coal required is to be unscreened, and to be delivered, in Trucks, free at the Haywards Heath Railway Station (L.B. & S.C. Rly.), either from the South Yorkshire or Durham Coal-Fields.

Payment, net cash monthly.

Tenders are to state the name of the Pits from which the above description of Coal will be supplied; the same to be fresh wrought and free from slate or any other objectionable matter for the purposes of gas making, and to the entire satisfaction of the Company's Manager.

The Board have no special Form of Tender, and do not bind themselves to accept the lowest or any Tender.

Tenders are to be received by me on or before the 29th day of May, and endorsed "Tender for Gas Coal."

(Signed) RUSSELL CORY,
Secretary.

85, Gresham Street,
London, E.C.

SEAFORD GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of 1500 (Fifteen Hundred) Tons of GAS COAL, to be delivered free at Seaford Station in quantities as required for the ensuing Twelve Months.

The lowest or any Tender not necessarily accepted.

No Forms.

Tenders to be delivered not later than the 2nd of June.

J. COWNEY,
Manager.

Gas-Works, Seaford,
Sussex.

OXFORD GASLIGHT AND COKE COMPANY.

THE Directors invite Tenders for the supply of about 34,000 Tons of best Screened GAS COAL, to be delivered to their Siding (G.W. Rly.), during the Year ending June 30, 1907.

Tenders, addressed to the Chairman of the Oxford Gaslight and Coke Company, and endorsed "Tender for Coal," to be delivered by June 9, 1906.

By order,
JAMES ELDRIDGE,
Engineer and Manager.

DENBIGH GAS AND COKE COMPANY, LIMITED.

TENDERS are invited for the supply of about 1500 Tons of Screened Wall and Bench or Main GAS COAL, to be delivered at Denbigh Station during the Twelve Months from the 1st of July, 1906, to the 30th of June, 1907.

Sealed Tenders, endorsed "Coals," to be addressed to the undersigned on or before Thursday, the 31st inst.

The lowest or any Tender will not necessarily be accepted.

By order,
W. EWART BROCK,
Manager and Secretary.

Denbigh, May 16, 1906.

SEVENOAKS GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Sevenoaks Gas Company invite TENDERS for 8000 Tons of GAS COAL (Durham or Yorkshire preferred), to be delivered at the Company's Siding, Bat and Ball Station (S.E. & C. Railway), Sevenoaks, Kent, for Twelve Months ending June 30, 1907.

Tenders must be sent in by not later than Wednesday, June 6 next, addressed to the Chairman, Wm. Henry Cronk, Esq., 88, High Street, Sevenoaks.

Further Particulars may be obtained from the undersigned.

HENRY HOW,
Secretary.

Gas Office, Sevenoaks,
May 16, 1906.

TENDERS FOR COAL.

THE Directors of the Town of Dudley Gaslight Company are prepared to receive TENDERS for the supply of about 15,000 Tons of GAS COAL or NUTS, to be delivered at the London and North-Western Railway or Great Western Railway Sidings, Dudley, or Great Western Railway Siding, Netherton, in such quantities as may be required from the 1st of July next to the 30th of June, 1907.

Sealed Tenders, addressed to the Chairman, and endorsed "Tender for Coal," to be sent in not later than the 28th inst.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Contract between Two or more Firms.

By order,
T. E. STILLARD,
Secretary.

Gas-Works, Dudley,
May 16, 1906.

LIST NOW OPEN.

THE LAINDON AND DISTRICT GAS LIGHT, COKE, AND WATER COMPANY (LIMITED).

Issue of 850 Six per Cent. Preference Shares of £5 each; 1033 Ordinary Shares of £5 each (Dividend Guaranteed); and 280 Five per Cent. £10 Debentures, Redeemable at a Premium of 5 per Cent.

NOTICE IS HEREBY GIVEN, that the Directors are now making this issue.

Prospectus and Forms of Application are obtainable at the LONDON AND COUNTY BANKING COMPANY, LIMITED, 21, Lombard Street, LONDON, E.C. (and all Branches), and the COMPANY'S OFFICE, 13, Walbrook, LONDON, E.C.

J. JAMES,
Secretary.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £10,000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 29, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 1200 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 29, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

MELTON MOWBRAY GASLIGHT AND COKE COMPANY, LIMITED.

10 £20 ORIGINAL SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 29, at Two o'clock.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WORTHING GASLIGHT AND COKE COMPANY.

NEW ISSUE OF 200 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £15,000 FIVE PER CENT. ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BRISTOL GAS COMPANY.

GEO. NICHOLS, HOWES, YOUNG, ALDER, and CO. are instructed to SELL by PUBLIC AUCTION, at their Sale-Room, 49, Broad Street, Bristol, on Thursday, the 14th day of June, 1906, at 2.30 p.m. precisely,

IN LOTS OF £100 EACH, OR LESS,

£30,000
FIVE PER CENT. MAXIMUM
GENERAL CAPITAL STOCK
AND
£10,000
NEW DEBENTURE STOCK

(Bearing *INTEREST AT THE RATE OF FOUR POUNDS PER CENTUM PER ANNUM*, payable Half-Yearly in June and December),

OF AND IN
THE BRISTOL GAS COMPANY,

Issued by the Company under their Statutory Powers.

The Stock will be Sold and Registered in the Books of the Company *free of every expense* to Purchasers thereof.

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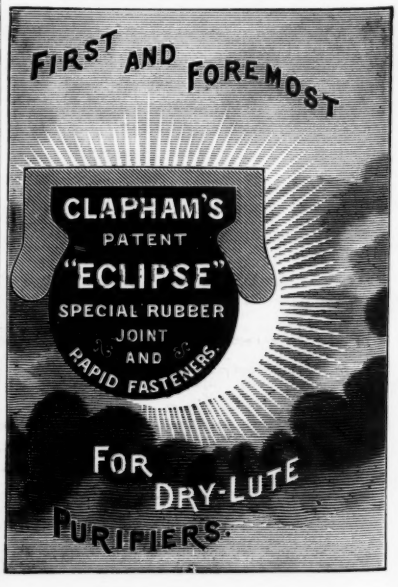

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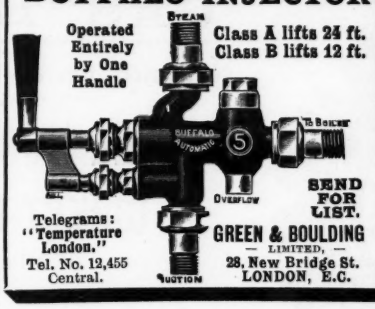

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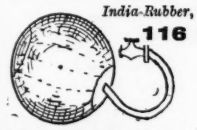
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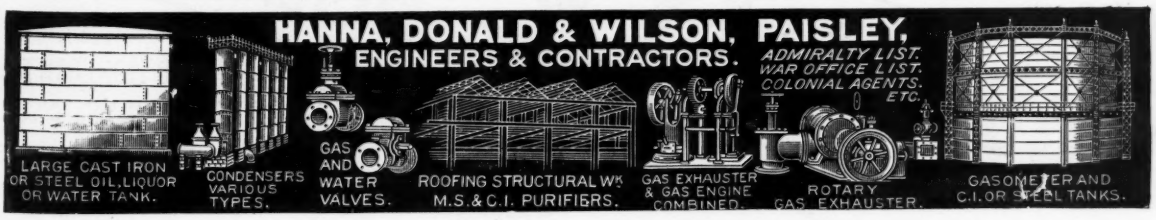
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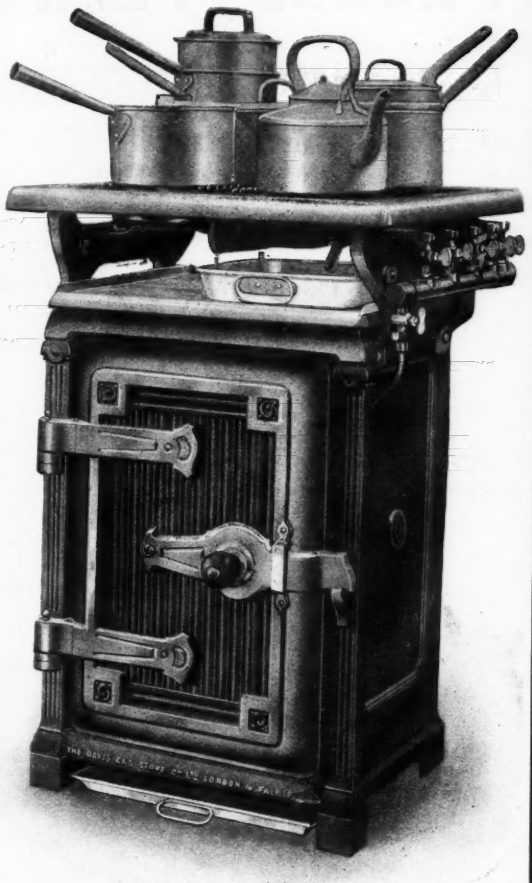

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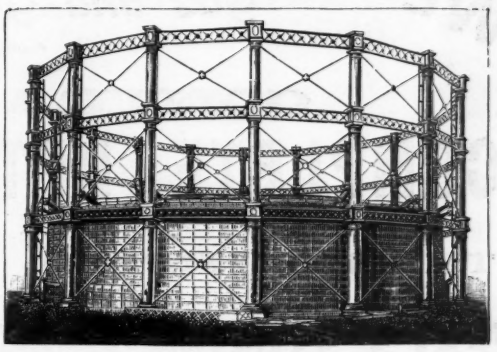

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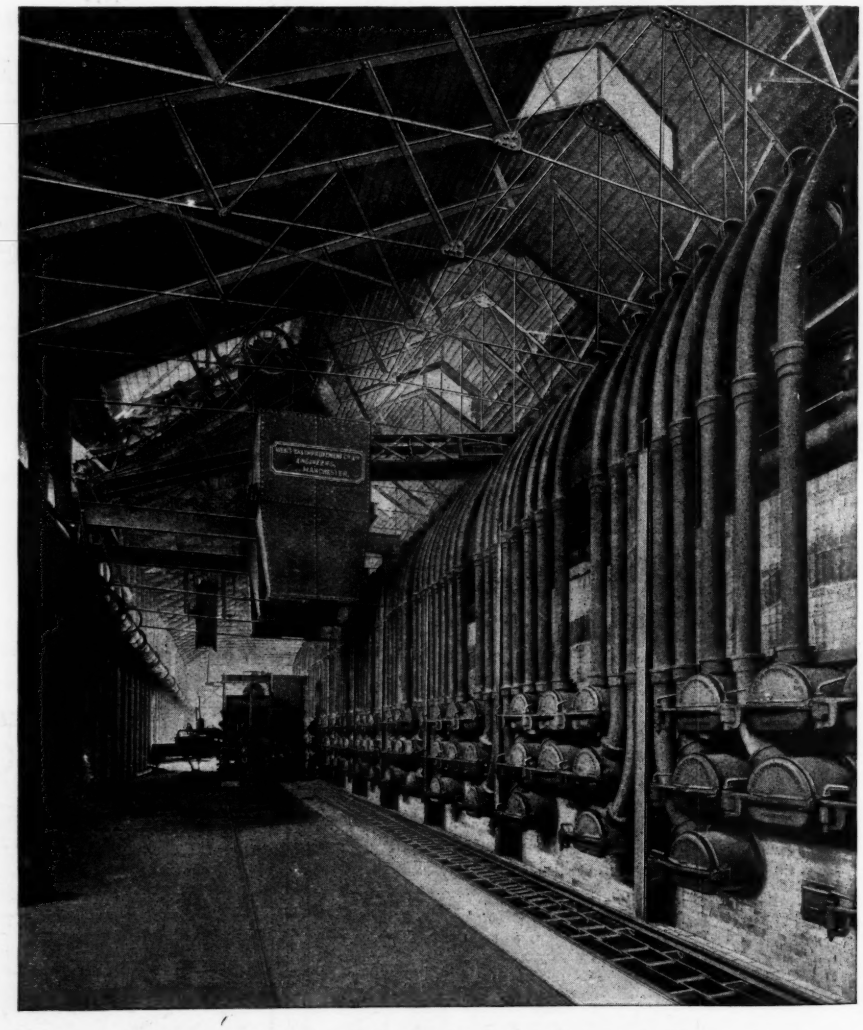

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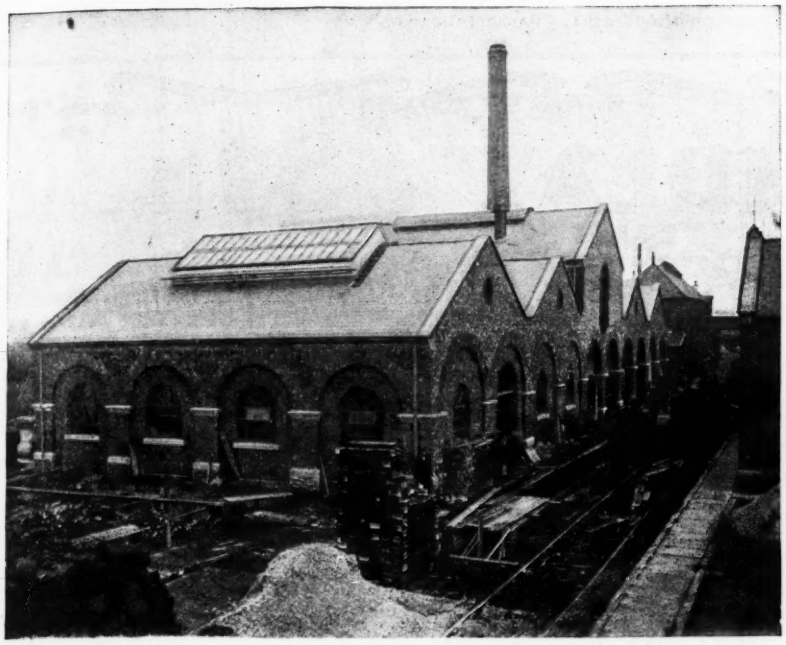

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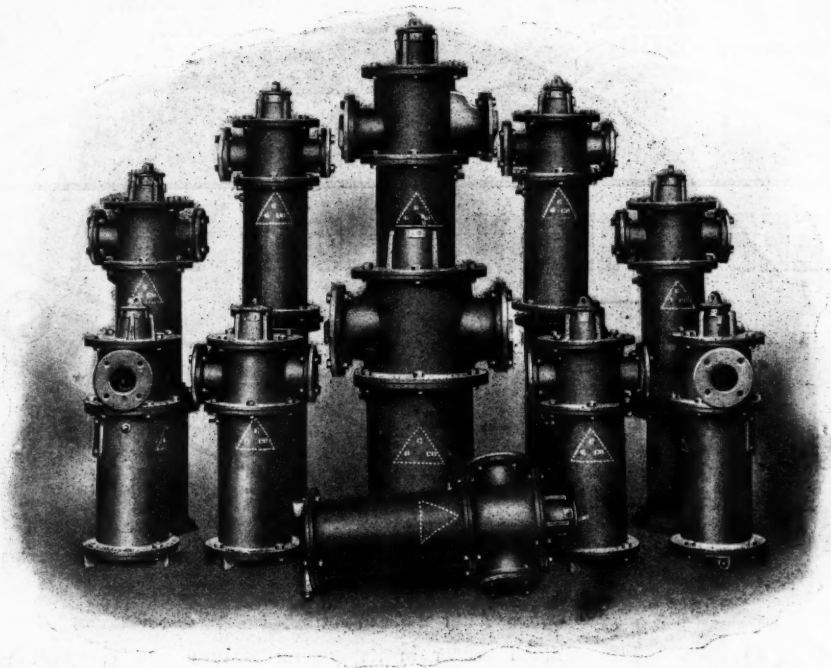

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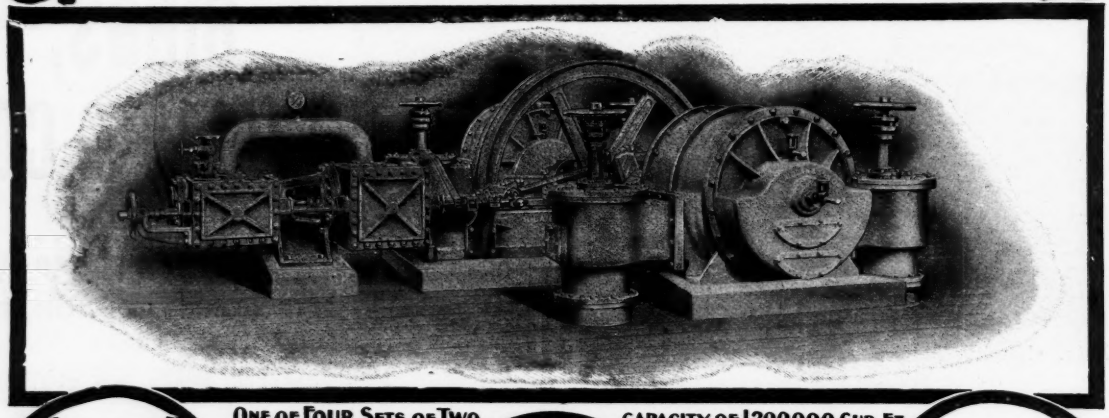

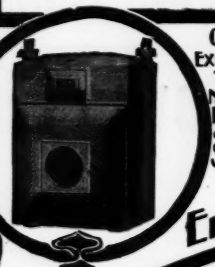

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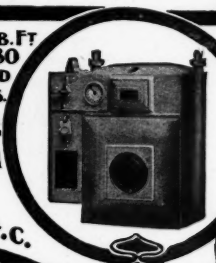

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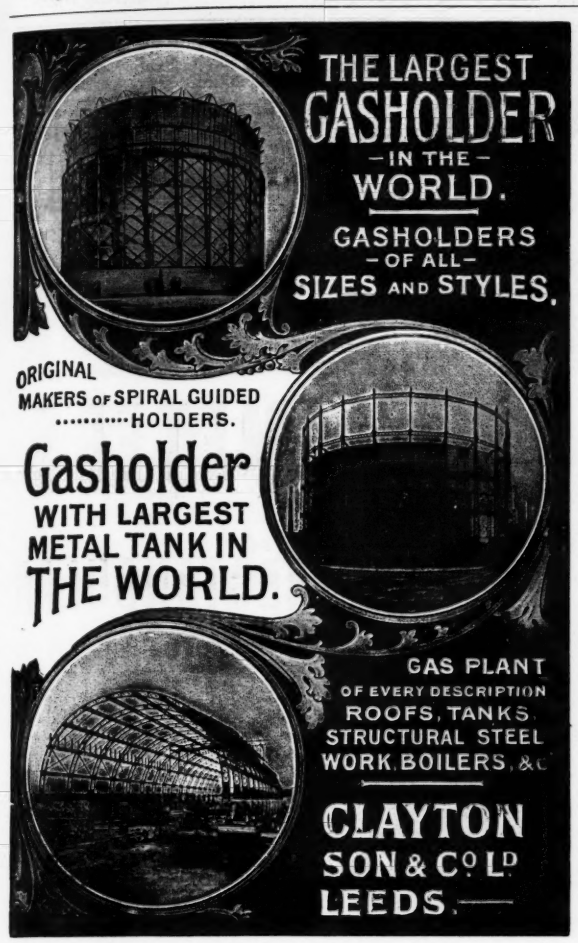

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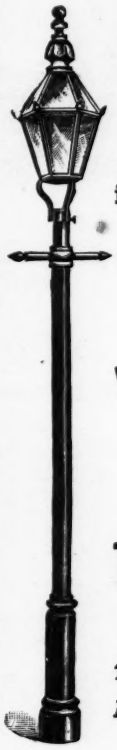

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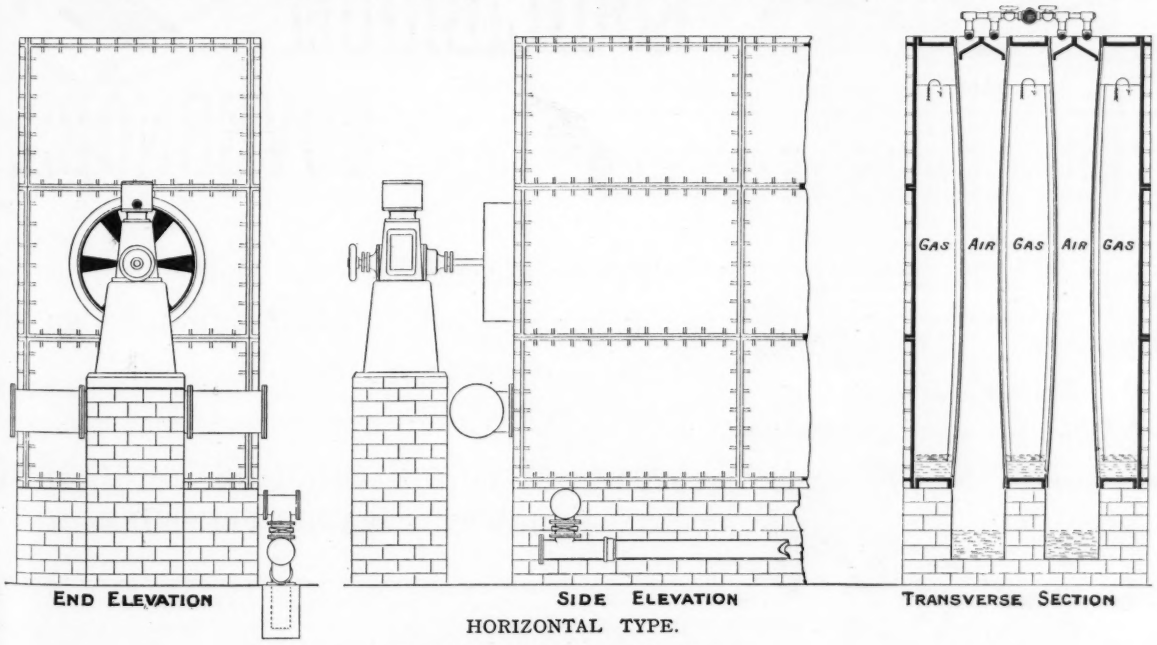

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